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Decolonizing Food Systems Research – The Case of Household Agricultural Food Access in Bikotiba, Togo

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DECOLONIZING FOOD SYSTEMS RESEARCH – THE CASE OF HOUSEHOLD AGRICULTURAL FOOD ACCESS IN BIKOTIBA, TOGO

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ABSTRACT

DECOLONIZING FOOD SYSTEMS RESEARCH –
THE CASE OF HOUSEHOLD AGRICULTURAL FOOD ACCESS IN BIKOTIBA, TOGO

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Indigenous West African farmers are among the most climate change threatened globally. Food insecurity is prevalent in West Africa because ecological, social, political, and economic instabilities, and globalization worsen climate pressures. In this study, I collaborated with the community of Bikotiba (bih-CO-ti-buh), Togo, to understand their household agricultural food access, one aspect of resilience to food insecurity. I adopted a feminist approach of reflexivity, radical vulnerability, and radical empathy, combined with decolonizing principles, to argue that there could be an ethical way for well-trained Western researchers to engage Indigenous communities, if negotiated carefully. Together, Indigenous Research Assistants and I developed and conducted semi-structured interviews in the local language, Bassari, with 56% of the heads of households in Bikotiba, and led community meetings with the demographics of men, women, and students. We learned that maize production in Bikotiba is threatened by climatic, political, and environmental changes, making maize subsistence a glaring leverage point in the community's food security, in addition to the social-political-economic and human rights injustices keeping rural farmers impoverished in Togo. This study demonstrates the cross-cultural possibilities to advance food systems research with Indigenous communities if Western scholars foster feminist decolonizing principles. This research is only possible if supported by communities like Bikotiba, and this study provides compelling insights on the possibilities when

communities support research. This dissertation is available in open access at AURA, http://aura.antioch.edu/ and OhioLINK ETD Center, https://etd.ohiolink.edu/etd.>

Key Words: Climate Change, Neocolonization, Feminism, Maize, Resilience to Food Insecurity, West Africa

Dedication

I dedicate this dissertation to my parents. I did it, Mom and Dad, and I could not have without you supporting my dreams – this is for you! I dedicate this dissertation also to my nieces and nephews – Hunter, Dylan, Reagen, Wyatt, Bennett, and Morgan – may you always follow your dreams, and I will be there to support you every step of the way. To Alycia and Jamie – I could not have made it through this journey without your unwavering love and support.

I dedicate this dissertation to the people of Bikotiba, Togo, who made this research possible. Specifically, I dedicate this to the advisors and research assistants who offered so much of themselves – Ismael[1], Angel, Clementine, Benitez, Moïse, and Jacques. To Ismael in particular, your care for me could never be forgotten. I also dedicate this dissertation to the woman who housed, protected, and welcomed me into her family, Awusi, to her son and my dear friend, Olivier, and to her granddaughter, Saye – you are my family. To the family that housed me during this research, Aleewa, Jean, Fare, Matilde, and Gbati – your care was generous and compassionate. I am eternally grateful to the entire Bikotiba community for their gracious generosity and for welcoming me into their homes, families, and culture. I admire their dedication to their futures.

[1] All names of Bikotiba community members are pseudonyms, some self-chosen, except for Saye, Mayi, and Paul.

Acknowledgements

This dissertation was only possible because the people of Bikotiba, Togo, welcomed me graciously into their community and homes for many years over the last decade. I thank the whole community for their participation in this research and for taking me in as one of their own. I hope that my respect for the Bikotiba people and culture will allow me to continue building relationships there well into the future. Specifically, this research would have been impossible without our research advisor, Ismael, and Research Assistants, Angel, Clementine, Benitez, Moïse, and Jacques. They guided every step of this research, facilitated our sharing knowledge, cared for me during the process, and they are true leaders in their community. I acknowledge the Chief of Bikotiba, Chief of the Bassar prefecture, and the Governor of the Bassar prefecture for allowing me to pursue this work with the people of Bikotiba. I acknowledge the Government of Togo for allowing me to continue this important work with the people of Bikotiba. I thank the Center for Tropical Ecology and Conservation at Antioch University New England for funding part of this research.

I give special thanks and acknowledgement to Koffi, Waké, Ikpindi, Paul, and Mayi for their guidance, advice, and unwavering support and encouragement over the last decade. Without them, telling this story would be impossible and my sense of place in Bassar would have been drastically different. I thank you for sharing the Bassari culture with me, taking me into your families, being some of my dearest friends, nourishing me, keeping me safe, and for always dancing with me!

I thank my long-time mentor and friend, Gerardo. You were the first professor who encouraged me to trust my capabilities and you encouraged me to keep pursuing my dream of a PhD. Thank you for your advice throughout this journey.

Last but certainly not least, I acknowledge my cohort and particularly the faculty at Antioch University New England for training me well to carry-out this research ethically and for advising me through this dissertation process. To my dissertation committee – Rachel, Jean, and Livia – your mentorship has helped form me into a scientist I am proud to be, and I could not thank you enough for your unwavering support throughout this journey.

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Chapter I – Introduction

Author's Note:

The views expressed in the entirety of this dissertation do not represent the views of the United States Peace Corps.

Introduction

Background

Our experiences shape how we see the world and can alter the way we live our lives. This dissertation developed from significant experiences in my life and work that I share with the Indigenous people in Bikotiba, Togo, a small West African country. I have lived and collaborated in Bikotiba (bih-CO-ti-buh) in some capacity for nearly three years since 2011. As such, I experienced Togolese culture and society. I developed personal relationships in the community and have a vested interest in their sustainable future. As my interest in Indigenous food security grew during my PhD studies, Bikotiba seemed the most logical community to engage for my dissertation research, if I would be welcomed.

In this dissertation, *Indigenous* means people and societies with historical, local context knowledge and experience of the environment; colonized historically and regarded subjectively by the Global North as "developing/low-income" or "third world" societies. Alternatively, *Western* societies are "developed/high-income" populations in the Global North; historically the colonizers and responsible for neocolonial globalization (A. Abdi, 2010; Chilisa, 2012; Pashby & Sund, 2020). The Indigenous people of Bikotiba were colonized historically and are still neocolonized today. As postcolonial theory posits, the impacts of colonialism are still functioning well (Asongu, 2013; Chimakonam et al., 2014; Matthews, 2012), while globalization and imperialism perpetuate continued colonization (A. Abdi, 2010) in Togo (e.g., international support of a known corrupt dictator) (Kohnert, 2021; Piot, 2010; Stiftung, 2016). During my years in Bikotiba, I formed a healthy skepticism of neocolonialism and development, even toward the Peace Corps organization that fostered this experience, as I discuss in Chapter II. My already developed relationships of trust with people of Bikotiba and my understanding of

decolonizing practices (L. Smith, 2012) (Appendix A) facilitated the research process and offered possibilities to minimize further disenfranchisement of the community (Chilisa, 2012).

When I boarded a plane to begin two years of service in the United States Peace Corps (PC) as an Environmental Action and Food Security Extension Agent (volunteer) in Togo in 2011, I had never left the United States before. I had no idea what the next two years of my life would entail. Previously "formally" educated in environmental science, I knew I would connect with the environmental aspect of my job description, but I was unsure what to think about the food security part. For two months, Togolese trainers taught me French, about Togolese culture, and about Togolese agriculture and food systems, but I still did not know what to expect from the community to which I would be assigned. When I arrived in Bikotiba, I spoke intermediate French (the national colonial language), spoke only a few phrases of the local language (Bassari—one of more than 40 local languages in Togo), had few possessions to care for myself, and did not know anyone.

My training in the Western academy (i.e., "formal education" that powerful, wealthy countries in the Global North deem superior to other ways of knowing) before arriving in Togo had not taught me sufficiently the inherent relationship between humans and the environment. I did not fully grasp the relationship until I met a young Bikotiba girl, Saye (pronounced: *sigh*), who helped change my worldviews.

When I arrived in Bikotiba in 2011, Baby Saye was six months old; she is the granddaughter of my host mother in Bikotiba, Awusi (pseudonym). PC volunteers are usually given local names when they arrive at their posts. There was another white, female volunteer (German) in the community 10 years prior who was give the local name for the first-born daughter, so I was given the name of the second daughter, Saye. During the following two years

my name was Saye to everyone I knew, and from then on, the baby and I were known in the community as Baby Saye and Big Saye, respectively. During those two years, I watched Baby Saye grow from an infant into a running, smiling, laughing, and talking two-year-old. Before that, I never thought it was possible for an adult to be best friends with a toddler, but that is what happened with Baby Saye and me. As I watched Baby Saye grow every day for two years, I learned I was wrong to have thought I could not learn from a toddler. I watched her learn to walk and talk, ill with malaria, given local beer until she was drunk, drink dirty water and put dirty objects in her mouth, laugh and dance, and curiously discover the world around her. It became clear to me over time that I care deeply about Baby Saye and want to do anything I can to help make her future better, even if only a little. I realized that I have a unique opportunity to use my "formal" education and my privileges as a white woman from the United States to study topics that fascinate me, *and* those topics are important, needed, and overlooked in Indigenous communities like Bikotiba. I anticipate critical eyes cast toward my bias in allowing Baby Saye's future to drive my research so significantly. However, I argue that bias is what taught me research standards and ethics, as well as methodological gaps in food systems scholarship (e.g., Western scholars not decolonizing Indigenous interactions or sharing knowledge) that I believe more researchers need to consider when collaborating with Indigenous communities.

Throughout those two years in Bikotiba with the PC, I developed relationships of trust against the odds of race, language, gender, and nationality. I worked with diverse Indigenous participants[2] toward the community's food security and witnessed how neocolonial (A. Abdi,

[2] I define *participation* in the context of the research relationship described herein as any person choosing to willingly contribute to the study. All community members were offered an opportunity to play a role. There were degrees of participation from Research Assistants to consenting interview respondents. No community member in Bikotiba wanting to contribute knowledge was turned away. Participation implies prior and informed consent. I refer to *participants* and *collaborators* interchangeably, though I technically distinguish the two based on consent. I consider collaborators those who engaged in informal discussions and advice with me for which no consent process occurred, though all collaborators were aware of this study and that it influenced my discussions.

2010; Kim, 2010) influences are still hindering the community and nation. I witnessed first-hand the unjust Western influences working toward their own greed that impact Indigenous peoples' futures. Further, I experienced the consistent and growing climate changes (IPCC, 2007; Jones & Thornton, 2003; Wittig et al., 2007) affecting food access in Bikotiba. Most importantly, perhaps, those two years taught me to break with Western research traditions to be a decolonizing (Battiste, 2008; Ezeanya-Esiobu, 2019; Fortier, 2017; Wane, 2005; Warner et al., 2010) force in the community by countering my latent oppressive tendencies (Pashby et al., 2020). Such lessons during those two years, in addition to my later PhD focus on food security and decolonization, led me to reengage the community to explore the conceptual framework that came to life in this dissertation.

In August 2016, I contacted my former work partners in Bikotiba and shared my desire to continue collaborating with them. They graciously welcomed me back in January 2017, eager to collaborate. Initially, I met with village elders and leaders to determine their interest in being a part of my Service Learning Project (SLP), an Antioch University doctoral program requirement, which assisted this community while enhancing my capacity as a researcher. The community requested help understanding their agricultural challenges. Thus, concurrently with my dissertation research, Research Assistants and I guided the community in participatory meetings to share climate projections for the region in a locally relevant way. Such Western-generated information is shared insufficiently with Indigenous communities to help them plan for food secure futures despite climate changes. During SLP planning in 2017, after hearing community challenges, I shared my ideas for this study with community leaders. They were interested in both understanding their food security and how the dissertation results could help them plan for

their futures. I received permission from the village Chief and village members to conduct this study and they expressed desire to participate.

Conceptual Framework

In building a conceptual framework for this dissertation, I synthesized eight schools of thought (Figure 1.1) to create the most locally relevant and ethical study possible with contributors in Bikotiba, Togo. I used feminist decolonizing principles as the community supported household interviews that were the foundation for understanding community food access. First, within the lens of neocolonialism, I used feminist principles of radical empathy (Nencel, 2014) and radical vulnerability (Nagar, 2015), combined with decolonizing principles (L. Smith, 2012), to practice reflexivity (Nagar, 2015; Nencel, 2014; Riach, 2009) on my actions as a powerful and privileged Westerner in an Indigenous space. This is what I call feminist decolonizing research. My focus on feminist decolonizing research with Indigenous participants in this article should not be confused with *Indigenous feminism*, which focuses on deconstructing Indigenous gender inequality (Green, 2007). Other scholars discuss decolonizing feminist research overall (McLaren, 2017). There are references to "feminist decolonizing research" and "feminist decoloniz(s)ation" in racial, ethnic, and immigration studies such as Skachkova (2000) and Tate (2019). There is additional focus on *black feminism* in decolonization, meaning the contestation of one common womanhood to decolonize the historically white feminist movement (Matiluko 2020). I have not found a reference to feminist decolonizing research in any social-ecological/food systems literature.

Second, to explore food access with participants in Bikotiba, I synthesized related concepts from resilience to food insecurity (Alinovi et al., 2010), resilient community food systems (Bizikova et al., 2016), and communities supporting research (Gruber, 2020; Kibler, 2020) through the lens of widespread climate changes predicted for West Africa (IPCC, 2012;

Jones & Thornton, 2003) and external neocolonial threats (A. Abdi, 2010; Kim, 2010). Synthesizing these practices (Figure 1.1) allowed me to address gaps in the research with the Indigenous community of Bikotiba, to lean on my prior relationships in the community and share knowledges across cultures, and to understand agricultural food access in the community.

In this dissertation, I argue that the most ethical way for Western researchers to engage Indigenous participants in food systems research and beyond, if invited by communities, is to synthesize feminist and decolonizing paradigms. While prior relationships and community invitations to synthesize knowledge together are the ideal, they are not the norm. Most Western scholars lack such privileges and in such instances, I only advise only scholars well-trained in feminist and Indigenous ethics to consider approaching Indigenous communities to whom they were not invited, with community needs guiding all interactions. My suggestions for further examples of feminist decolonizing research in practice in this dissertation is *not* my advising a free-for-all approach to Indigenous communities. Rather, my advice is for past and future examples from Western scholars of all disciplines of their engagements with Indigenous communities that were/are guided by decolonization and feminism.

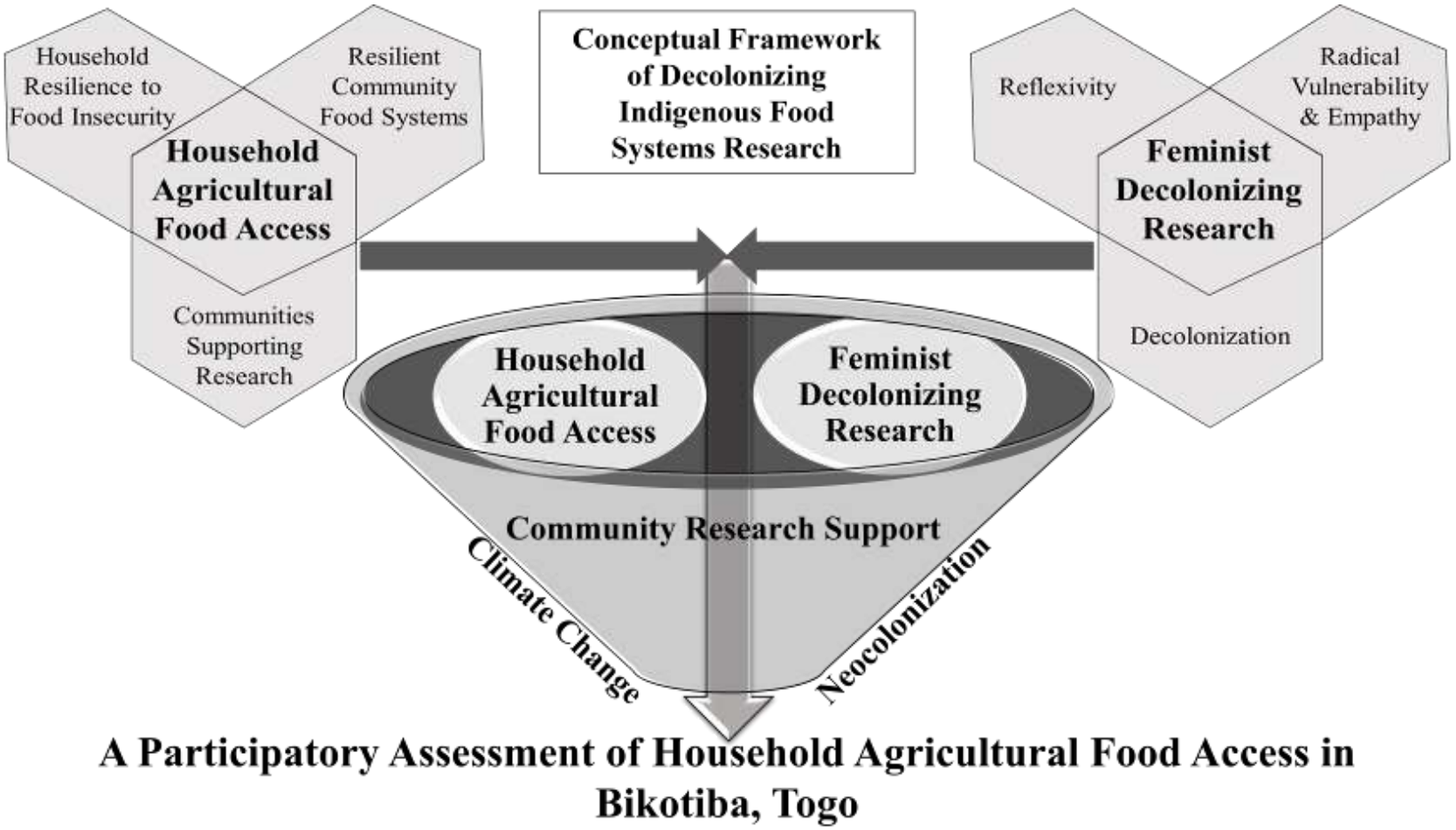

Figure 1.1. Conceptual framework for decolonizing food systems research that I developed and employed with Indigenous collaborators in Bikotiba, Togo. By funneling the concepts of household agricultural food access (comprised of the theories of communities supporting research, household resilience to food insecurity, and resilient community food systems) with the concepts of feminist decolonizing research (comprised of theories of decolonization, reflexivity, and radical vulnerability and empathy) through internal community research support and the external threats of neocolonialism and climate changes, I arrived at this study: a participatory assessment of household agricultural food access in Bikotiba, Togo.

Neocolonization

Indigenous peoples are rightfully very critical of Westerners engaging them for research as safeguarding imperialism, or regarding Indigenous peoples as "less than" Westerners and mere research "objects" (Logan, 1999). I believe many in the Global North are misguided by the notion that colonization ended when African nations gained their independence. For example, Rudi et al. (2012) assert that, "Largely colonized by Great Britain, France and Portugal, the states of Sub-Saharan Africa slowly started regaining independence after the Second World War and the whole continent was decolonized by 1980" (p. 2). Rudi et al. (2012) are wrong, and this is a dangerous statement to make within the Western academy. Further, I assume that most Sub-Saharan African Indigenous communities would disagree with the presumption that nations' independence meant the continent was free of Western oppression by the 1980s. This misconception is common, but postcolonial theory tells us that colonization is still impacting Indigenous people today (Kalu & Falola, 2019) through continued globalization (i.e., imposition of modern, liberal socio-political-economic ideals as superior and to be imposed on developing nations to save them from impoverishment, but without attention to local needs) (A. Abdi, 2010; Asongu, 2013) and imperialism (Logan, 1999). Africa is still neocolonized today (Kalu & Falola, 2019; Logan, 1999; Wane, 2005). Neocolonization is a continued, concerning imposition of colonial worldviews onto Indigenous peoples, such as the deculturation of Indigenous spiritual systems through pressure from Western missionaries to accept Western religious ideologies that Kim (2010) discusses. Kim (2010) calls neocolonialism "a new manifestation of imperial domination after 'formal' colonialism ended by the anti-colonial resistance and independence movements worldwide" (p. 11) that is based on the assumed globalized economic superiority of "developed" nations (A. Abdi, 2010; Kim, 2010). Societies like those in Togo that were colonized historically and are neocolonized today through globalization (le Grange, 2018) should

be wary of privileged and powerful Western researchers who have more often practiced scientific colonialism (Ciofalo, 2019), taking Indigenous cultures and knowledges for Western purposes and disregarding Indigenous needs (Chilisa, 2012; Datta, 2018; Mataira, 2019; Nadasdy, 1999; L. Smith, 2012).

Abdi (2010) discusses in-depth Africa's neocolonial history and states that, "The relatively new phenomenon of highly organized globalization has now been with us for about thirty years. Yet the realities of generic globalization would be as old as the first collective systems of humanity itself" (p. 1). Through neocolonialism, nations from the Global North continue exerting power and a liberalized agenda across the globe, as during the colonial era, while most populations in the Global South suffer the consequences (A. Abdi, 2010; Kim, 2010). Neocolonization has diverse effects on nations in the Global South today, impacting education, politics, technology, commerce, religions, economies, and more (Abdi, 2010; Kim 2010). Through the imposition of Western ideals, Indigenous educational and religious systems are continually eroded as the Western academy and religious missionaries thrust themselves into Indigenous spiritual and intergenerational deculturation (A. Abdi, 2010; Kim, 2010). Globalization and Western interests in African resources have supported many corrupt African states' political systems that have little interest in serving the oppressed and impoverished in their nations (Yeros, 2002), like the Togolese regime (Kohnert, 2021). Globalized and liberalized commerce, markets, and economies in Africa are based on systems of the Global North that support top-down wealth, greed, and disinterest in the impoverished peoples unable to compete or sustain in such systems (A. Abdi, 2010; Kalu & Falola, 2019).

Neocolonialism continues today in nations like Togo, as I have witnessed (e.g., top-down agriculture based on Western models as "superior"). This globalized and imperial (Swadener &

Mutua, 2008) imposition of worldviews from the global north challenges African nations today (A. Abdi, 2010). In their discussion of South Africa, for example, W. Martin (2019) quotes Bond (2006, p. 113), who states that, "modern imperialism necessarily combines neoliberalism and accumulation by dispossession in peripheral sites like Africa along with increasing subservience to the USA's indirect, neocolonial rule" (p. 54). For example in Togo, subsistence (i.e., cultivating less than two hectares to live from for the year) (George, 2014) agriculture supports 60% of the nation's economy (Kohnert, 2021). Still, the nation's agricultural policy disregards those farmers' needs in support of globalized, modernized, and liberalized agriculture (Ali, 2017), which supports the top ruling classes financially. In their discussion of Zimbabwean peasant workers, Yeros (2002) explains this postcolonial support of privileged top-down ruling forces, stating:

> Mandaza [1986] observed that, despite a decade of armed struggle, a negotiated settlement had bequeathed a typical neo-colonial state in Zimbabwe, which was 'nonconventional' only insofar as formal political power had not been ceded to an African petty bourgeoisie alone but jointly with a 'constitutionally safeguarded' white settler element. This reality produced a special sub-type of neo-colonial politics. The 'post-white settler colonial state' was characterised, first, by the persisting obstruction of an African 'national' bourgeoisie by the settler presence, which in turn offered prospects of advancement only to a section of the petty bourgeoisie; and second, by the petty-bourgeoisie's own use of the settler presence as an excuse for developmental delays and as a means of extracting concessions for itself, while in the long run developing a class alliance with it, against peasants and workers. In this process of 'embourgeoisement' lay also the roots of state repression against the disenfranchised. (p. 121)

This "post-white settler colonial state" (Yeros, 2002, p. 121) is true for Togo's dictatorship, beginning in 1967 (Kohnert, 2021). This situation is evident still today as seen in the Togolese ruling bourgeoisie, which keeps the nation's Indigenous subsistence farmers impoverished and overlooked (Kohnert, 2021). All the while, the Togolese bourgeoisie's dismissal of significant human rights violations is fostered internationally due to capitalized greed and "security interests in the region" (Kohnert, 2021, p. 9). This bourgeoisie trend is common throughout postcolonial

Africa and the "exploitation of the continent continues" by ruling minorities with international support (Kalu & Falola, 2019, p. 20). Also like Zimbabwe, Togo faces an "overaccumulation crisis" based on the globalized example of the ruling class that has led to "uneven development" (Yeros, 2002, p. 122). Togolese participants tell me that the rural poor spend money to accumulate things for the appearance of wealth based on the globalized example of overaccumulation from the nation's minority. This overaccumulation dilemma (Yeros, 2002) has led rural Togolese farmers to intensify their globalized maize production (Bjornlund et al., 2020; Cherniwchan & Moreno-Cruz, 2019; McCann, 2001) to attempt this appearance of wealth, to the detriment of their families' food security. West African "low income" nations suffer in the reality of neocolonized agriculture because smallholder crops cannot compete in the modernized global markets (Pingali, 2007) prioritized by the Economic Community of West African States (ECOWAS, 2005).

Decolonization

Decolonizing principles are the foundations of ethical research with Indigenous peoples, or what Paris and Winn (2014) call the basis of humanizing research. I focused on L. Smith's (2012) 45 decolonizing principles for Indigenous projects (Appendix A) in this dissertation. It is important to note, however, as Guerin (2000) did, that L. Smith's (2012) principles are not a how-to manual, but rather are "about seeing research in the context of colonialism and in the context of Indigenous communities and life" (p. 439); L. Smith's (2012) primary audience and focus were to foster more Indigenous peoples as researchers. While I am non-Indigenous, it is my responsibility *at minimum* to understand these decolonizing principles (Appendix A) and honor them when interacting with Indigenous collaborators, as I did in this study. L. Smith's (2012) first 25 decolonizing principles are discussed most in the literature. She describes the first

25 principles, stating that, “Within an Indigenous framework, methodological debates are ones concerned with the broader politics and strategic goals of Indigenous research. It is at this level that researchers have to clarify and justify their intentions” (L. Smith, 2012, p. 164). L. Smith (2012) presents 20 additional decolonizing principles of Indigenous projects that underpinned this study too. The author, “conceptualize[d] these projects based on trying to understand, deeply and creatively, where [they] see communities spending their energies and, as well, what [they] hear community activists, organizations, scholars and researchers identify as significant work” (L. Smith, 2012, p. 187). L. Smith (2012) says these additional 20 Indigenous principles are, “intellectual, creative, spiritual, collective, individual and physical work. They are knowledge projects that stretch across standard disciplines of knowledge and diverse ways of knowing, of epistemologies and ontologies” (p.187). I include all 45 principles (Appendix A) because I believe the work in this study fits this description of co-producing knowledge across disciplines, cultures, and epistemologies (L. Smith, 2012).

My focus in this dissertation is on decolonization versus Indigenous research methodologies (IRM) (Chilisa, 2012). IRM are what Westerners often call their research *on* Indigenous peoples (Atalay, 2012; Ciofalo, 2019; Dunbar, 2008; L. Smith, 2012; C. White & Denborough, 2014). IRM also refer to Indigenous researchers studying theirs or others’ indigeneity (Bennett et al., 2002; Ciofalo, 2019; Dunbar, 2008; Minthorn & Shotton, 2018), and use of Indigenous paradigms by Western or Indigenous researchers as guiding principles in specific contexts (Kumar & Pattanayak, 2018; Minthorn & Shotton, 2018). However, my own worldview and therefore research approaches are based on critical race theory and mirror common Indigenous values of relationality, dismantling power in research, reverence for oral histories, collectivity, reciprocity, and that past and present colonial harms impact one’s ontology

and epistemology (Atalay, 2012; Brown & Strega, 2005; Chilisa, 2012; Ciofalo, 2019; Dunbar, 2008). Based on those worldviews, my focus in this study was decolonizing Western research *for*, *with*, and *by* Indigenous collaborators (Atalay, 2012; Brown & Strega, 2005). In choosing to refer to decolonizing principles versus IRM, I also followed reflections of Gone (2018), an Indigenous scholar, who lists eight concerns with IRM, including unfulfilled promises, shielding research from suspicions, focusing research on Indigenous identity versus knowledge generation, suppressing existing IK, and "marginaliz[ing] existing (but nonacademic) Indigenous knowledges" (p. 47).

In addition to L. Smith's (2012) principles, to understand and practice decolonization ethically as a Western researcher, I drew on guidelines from: Battiste (2008) (e.g., ethics for engaging Indigenous peoples, such as focus on Indigenous languages), Brown & Strega (2005) (e.g., anti-oppressive theories and criticisms of white feminism), Chilisa (2012; 2014) (e.g., differences between Western academic and Indigenous knowledge systems; five phases of decolonization for Indigenous communities: recovering and rediscovering Indigenous experiences and knowledges, mourning past and present colonial attacks on non-Western cultures, dreaming of new possibilities, and committing and acting to deconstruct colonialism), Denzin et al. (2008) (e.g., postcoloniality, critical race theory, and postcolonial feminism), Ezeanya-Esiobu (2019) (e.g., Indigenous African knowledge), Fortier (2017) (e.g., active consent and anti-appropriation), Kumar and Pattanayak (2018) (e.g., the importance of context), Owusu-Ansah and Mji (2013) (e.g., Afrocentricity), and Wane (2005) (e.g., reforming the academy to foster and protect African Indigenous knowledge).

In this study, I worked to foster all decolonizing principles and phases that were within my power. I incorporated aspects of various decolonizing methodologies that have been

described in the literature including the equitable engagement of local participants with specialized knowledge and the fostering of Indigenous languages aspects of co-research (Datta et al., 2015; Feit, 2019), the contextual social action aspect of participatory action research (Swantz, 2015), the cultural observation and storytelling aspects of ethnography (Pillow & Mayo, 2012), and the reciprocation and knowledge sharing aspects of community based participatory research (Atalay, 2012). I also followed tenets outlined by the feminist and Indigenous authors throughout Research as Resistance by Brown and Strega (2005). My belief in social justice guided all parts of this research by embracing differences-centered critical theories, meaning that there are diverse truths from which powerful, dominant structures in society can be dismantled (Moosa-Mitha, 2005). In the West African context of this dissertation, I also heeded decolonizing advice from Indigenous scholars like Owusu-Ansah (2013) (e.g., focus on uniqueness of the contextual worldview and understanding that research must dismantle systemic oppressions, or it cannot claim objectivity) and le Grange (2018) on decolonizing African Indigeneity (e.g., navigating complicated conversations).

Feminism

The tenets of decolonization and feminism both align as noted by Nagar (2015). Feminism, like decolonization, is a complex discipline with a storied history, making it uneasy to define (Osborne, 2001). However, definitions exist, and Osbourne (2001) quotes the most basic definition from the 2001 Chambers Dictionary that called feminism "advocacy of women's rights, or of the movement for the advancement and emancipation of women" (p. 6). The definition has been updated in the Chambers 21st Century edition as, "A belief or movement advocating the cause of women's rights and opportunities, particularly equal rights with men, by challenging inequalities between the sexes in society" (Murray, 2021, para. 1). Modern feminism

has embraced a wider social justice focus and branched into *womanism*, *black feminism* and *intersectional feminism*, for example, which focus on ensuring that feminisms serve more than white women's cultures and struggles that historically dominated the movement. Feminist systems theory arose from critical systems theory, or the principles of intentional social actions for "emancipation or liberation from oppression, with a commitment to achieving mutual understandings" (p. 555), and dismantling power through participatory research (A. Stephens et al., 2010). Feminist systems theory builds on these principles to include gender sensitivity (i.e., ensure women's stories are told equally in writing), valuing typically excluded voices (i.e., appreciate and seek input from all perspectives, not just the privileged), shifting from human centered research to include focus on the environment, choosing the best methodologies (i.e., commitment to multidisciplinarity and reflection), and, "Undertak[ing] research that promotes plurally desirable and sustainable social change" (p. 557) (i.e., focus on local context and representing voices authentically) (A. Stephens et al., 2010). Many of these principles of feminist systems theory mirror decolonizing principles of gendering, revitalizing, returning, intervening, reframing, protecting, and discovering (Appendix A).

A social science and feminist practice is reflexivity, particularly in cross-cultural exchanges for knowledge sharing and generation (Chilmeran & Hedström, 2021; Hesse-Bibber & Piatelli, 2012; Riach, 2009). Reflexivity, or reflexion, is a consistent process of deconstructing one's actions and experiences during and after research (Nagar, 2015). Nagar (2015) says, "We must discuss more explicitly the economic, political, and institutional processes and structures that provide the context for the fieldwork encounter and shape its effects—an aspect that has often taken a backseat in reflexive exercise" (p.85). Feminist social scientists have typically

practiced, "a *speaking-with* model of engagement between researcher and researched[3]—an approach that involves talking and listening carefully, and openness to influences of people from varied sociocultural locations" (p. 85). Particularly, Nagar (2015) states when Western researchers traverse international borders and try to engage participation across cultures, they must have contextual knowledge, and practice reflexivity and positionality. In cross-cultural research, scholars must position (Appendix A) themselves, or acknowledge explicitly their powers and privileges (i.e., race, nationality, class, education, and gender) as situated in relation to participants (Hesse-Bibber & Piatelli, 2012; Nagar, 2015; Nencel, 2014). Reflexions allow a researcher to deconstruct power imbalances with participants, providing an opportunity to dissuade latent oppressions and biases (Hesse-Bibber & Piatelli, 2012).

The feminist principle of radical empathy could also allow a Western researcher to interact with cross-cultural participants ethically (Nencel, 2014). Nencel (2014) counters arguments against researcher self-reflexivity (Hesse-Bibber & Piatelli, 2012) and asserts that radical empathy and situated positionality could allow Western researchers to be successfully reflexive. Reflexion requires that researchers deconstruct ontological assumptions of the Global North as to what research should be (Nencel, 2014). Nencel (2014) suggests that reflexions should be situated based on the researcher's positionality (Appendix A) and that reflexions are altered by the study objectives and knowledge shared. If a researcher hopes to situate their positionality (Appendix A) in relation to Indigenous research partners and practice decolonized reflexion (Appendix A), "a politics of radical empathy" (Nencel, 2014, p. 81) is required. This politics means to instill connectedness and compassion in all aspects of the research process to represent collaborators' existences authentically and with empathy (Nencel, 2014). To decolonize feminist research when "crossing borders" (Nagar, 2015, p. 136) and practice

[3] In Chapter II, I discuss linguistic choices when referring to the Indigenous peoples with whom we work.

reflexivity successfully, researchers should practice radical vulnerability in addition to radical empathy (Nencel, 2014).

Nagar (2015) calls radical vulnerability commitment to,

> Opening up spaces for negotiation by always returning us to the ethics of how and why one comes to a story and to its variable tellings and retellings. The telling of stories must continuously resist a desire to reveal the essential or authentic experience of the subject; instead, every act of storytelling must confront ways in which power circulates and constructs the relationalities within and across various social groups. (p. 14)

Radical vulnerability is a part of the "politics of knowledge production" (Nagar, 2015, p.14). When Western researchers encounter cross-cultural challenges of, "location, power, translation, and representation" (p. 15), radical vulnerability and reflexivity can facilitate partnerships and co-authorship of shared knowledge (Appendix A) (Nagar, 2015). Radical vulnerability is not reserved for the researcher, but for all participants in successful co-research (Nagar, 2015). Nagar (2015) states that, "Processual reflexivity and crossing borders with situated solidarities require openness to rethinking dominant standards of academic productivity" (p. 890). In Chapter II, I argue that reflexivity, radical vulnerability, and radical empathy[4] could allow Western researchers an ethical place in research with Indigenous participants, if a community supports research negotiated (Appendix A) carefully (L. Smith, 2012).

Communities Supporting Research

As in Bikotiba, Battiste (2008) noted that not all Indigenous communities oppose collaborative research with Westerners. If an Indigenous community recognizes respect, reciprocity, and connection in Westerners and therefore negotiates (Appendix A) research with Western scientists, it is the researchers' responsibility to decolonize, protect Indigenous ownership of history and knowledges, and share Western knowledge with the community for

[4] Radical vulnerability and radical empathy are discussed in disciplines other than feminism. Radical vulnerability is seen also in psychology and art while radical empathy is also visible in the fields of art, racial studies, immigration studies, psychology, and sociology.

their discovery (Appendix A) (L. Smith, 2012). Gruber (2020) and their contributing authors demonstrate how individuals, local leaders, and others can support a community's social-environmental health, assuring a strong foundation on which it can thrive with "trust, collaboration, social justice, and where conflicts or disagreements are resolved amiably" (p. 2). While Bikotiba's support of research is the focus of Chapter III, I experienced aspects of all 12 principles of communities with healthy futures as outlined by Gruber (2020); particularly, working together (e.g., Research Assistants working toward their common future), being transparent (e.g., participants' and my honesty during exchanges), protecting resources (i.e., physical protection of community gardens), embracing feedback (e.g., my mentions of deforestation issues), and practicing leadership as many community members did in this study. I believe the community's foundation was strengthened by supporting this research. Gruber (2020) lists the challenges of top-down approaches, such as when researchers infiltrate communities for their own Western desires (e.g., publication) versus local Indigenous needs. The author advocates that if communities embrace these 12 principles, they will have stronger foundations for a healthy future (Gruber, 2020). Gruber (2020) asserts that these principles could be widely applicable internationally for local leaders wanting to help their communities flourish. Research is not just by a Western-trained scientist *on* a community, but rather through engaging, sharing, and generating knowledges together, which should always include local knowledge, and particularly Indigenous knowledge in respective contexts (Gruber, 2020). The author lists six reasons for communities to consider supporting research: (a) creation of useful shared information, (b) decision-making based on all available knowledge, (c) integration of multiple knowledges, (d) economic understanding of resource values, (e) continuous research could improve the community foundation, and (f) including community members as co-researchers

(Gruber, 2020). In Chapter III, I build on Gruber's (2020) assertions to show how the community of Bikotiba supporting research helped them gain new knowledge that could aid their agricultural futures, with mounting climate change and other exogenous threats.

Threats to West African Farmers

Indigenous African societies comprise a high proportion of the world's rural poor (Altieri et al., 2011; Nyoni, 1987; P. Sanchez, 2000). Despite West Africa having the highest regional poverty on the continent, the prevalence of extreme poverty (living on less than $1.90 USD daily) (OXFAM, 2020) has decreased in the region from 94% to 60% from 1995 to 2000, respectively (Oduro et al., 2003), to approximately 30% in most nations in the region in 2018 (OXFAM, 2020). Still, the economic growth benefits the "top one percent [of] West Africans [who] own more than everyone else combined in the region" (OXFAM, 2020, para. 3). Agriculture is considered the solution to economic development across the African continent; 65% of the working population in Africa are farmers and agriculture contributes to 29% of the region's Gross Domestic Product (Bonfoh et al., 2016). The current Agricultural Policy of the Economic Community of West Africa States begins by calling agriculture the "backbone of [West Africa's] economy" and it calls for opening regional and national markets to producers, synergizing agricultural institutions, sustainable agricultural intensification, and more (ECOWAS, 2005). Yet, the context specific, socio-economic complexity of agriculture has resulted in too many constraints (e.g., technological, socio-cultural, institutional, economic, and infrastructure) to African agricultural advancement (Bonfoh et al., 2016). Malnourishment is also prevalent in West and Central Africa, with 15 million acute cases projected by the United Nations Children's Fund (UNICEF) in 2020, which was higher than predicted due to "growing insecurity and Covid-19" (para. 2). This prevalence of malnourishment is attributed to unequal

access to formal education and early marriages, particularly for women (Sagalova et al., 2021), as well as poverty, a globalized economy, insufficient access to health facilities (Akombi et al., 2017), political instability, and more. In West Africa, the prevalence of undernourishment is down from the year 2001 (15.8%), but still higher in 2018 (14.7%) than it was at a low in 2012 (12%) (GNR, n.d.). In West Africa, malnutrition overwhelmingly effects those under age five, though the overall prevalence of being underweight in the region decreased from 2000 to 2016 for children identified as girls (27.8% to 22.8%, respectively) and boys (43.7% to 34.6%, respectively), and for adults identified as females (12.4% to 9.5%, respectively) and males (14.3% to 10.9%, respectively) (GNR, n.d.).

Traditional agricultural practices of Indigenous peoples have been largely eradicated in Africa due to globalization and imposition of Western agriculture as superior (Lwoga et al., 2010). Lal et al. (2015) note the importance of intergenerational knowledge for social, agricultural, and environmental sustainability. Indigenous knowledge (IK), also commonly referred to as traditional ecological knowledge, is defined broadly as the whole ecological knowledge, worldview, and practice system of a group of people carried on across generations and significantly informed by culture, belief, and experience (Berkes, 2004; Berkes et al., 2000; Ezeanya-Esiobu, 2019; Lwoga et al., 2010). The inherent value of IK is long recognized but its place in farm management and conservation has been debated by the Western academy; many scholars share a long held assumption that Western science and management strategies are superior to IK and that IK is something to be *used* by Western scientists (Adams et al., 2014; Nadasdy, 1999). This perception exists despite compelling research articulating the complementarity of IK and Western knowledge (Chilisa, 2012; Richmond et al., 2013; Turner, Ignace, & Ignace, 2000). For example, Sileshi et al. (2009) discovered vast Massai rangeland

pastoralist knowledge about termites and the need for Western research to recognize their innovative practices. Despite the evident comparable qualities of IK and Western knowledge, some scholars warn against viewing them as complementary; efforts to incorporate IK into management often lead to compartmentalization of IK to distill information beneficial to Western agendas (Nadasdy, 1999). Indigenous knowledge should instead be considered a legitimate source of knowledge, experience, and practice in its own right (Nadasdy, 1999).

Indigenous societies are particularly vulnerable to food resource scarcity and seasonal hunger due to high yield gaps, which point to "failure in [food] availability or accessibility" (Grace et al., 2017, p. 371). For example, due to the Covid-19 pandemic, the Economic Community of West African States reported that the "pandemic could increase the number of people at risk of a food insecurity and malnutrition from 17 million to 50 million people between June and August 2020" (Le Privé, 2020, para. 1). Food systems are inherently complex and uncertain, just like other social-ecological systems, meaning interrelations between human and natural capital of a system at a given scale (Cabell & Oelofse, 2012; Cumming, 2014; Foran et al., 2014). Social-ecological systems theory recognizes that single discipline approaches are insufficient to capture the dynamic, complex, and uncertain relationship between the social and natural capital in a system (Cabell & Oelofse, 2012; Cumming, 2014; Foran et al., 2014). Both complex systems theory (CST) and network theory (NT) help us to better conceptualize intricate food systems. CST acknowledges that food systems are not static or linear, are delimited by disturbance, and are characterized by uncertainty and variability; maintaining function in food systems demands biodiversity, selection, and complex feedbacks between system components (Allen et al., 2011). Understanding networks of system components is essential to grasping food system complexity (Norberg & Cumming, 2008). Network theory posits that food system

components are connected through chaotic underlying patterns; understanding these patterns is critical to management (Díaz-José et al., 2015). CST and NT are both required to holistically study social and ecological relationships in a system; still, examples of such holistic approaches are infrequent (Berkes, 2007a; Darnhofer et al., 2011; Folke et al., 2010). Complex systems theory tells us that increasing global homogenization of landscapes will likely lead to large-scale systems' collapses (Zhang et al., 2015). Therefore, it is necessary to understand the complexities of food systems to fully grasp vulnerabilities and leverage points for food system resilience, particularly with climate change and globalization pressures.

Climate change and habitat destruction drive deforestation and land-use changes in West Africa and the tropics, threatening biodiversity, ecosystem services available to humans for agriculture, and therefore food security of the most vulnerable populations in the world, Indigenous farmers (Bradshaw et al., 2009; IPCC, 2007; Stork, 2010; W. Turner et al., 2010). There is room for speculation about how climate change will alter global food production because models predict multiple outcomes (Thuiller, 2006). Climate models predict that the rainfed agriculture in West Africa and Togo, particularly maize (i.e., corn), will be highly impacted by temperature increases and rain variability, which could reduce the primary subsistence maize yields by up to 200 kilograms per hectare by 2055 (Ahmed et al., 2015; Jones & Thornton, 2003; Riede et al., 2016; Sultan & Gaetani, 2016; Yaro et al., 2016). Climate changes are compounded by poverty, lack of extension services, and limited health knowledge and care (Altieri et al., 2011; Baudron & Giller, 2014; Ericksen et al., 2009; Kremen, 2015; Tscharntke et al., 2012; Yaro et al., 2016; Ziervogel & Ericksen, 2010). In addition to ecological and climate change pressures, smallholder African farmers face a loss of intergenerational agricultural knowledge (Fagbemissi, 2010; Gyapong, 2021; B. White, 2012); protecting

intergenerational Indigenous knowledge is one of Smith's (2012) decolonizing principles (Appendix A).

Smallholder farmers, or those living from crop harvests of two hectares or less (George, 2014), comprise 60% of the West African population (Danso et al., 2018). Smallholder populations rely on agriculture (i.e., planted crops and livestock) for their livelihoods, which are threatened by globalization, industrialization, and policy pressure to meet food production needs (Altieri et al., 2011; Tscharntke et al., 2012; Warner et al., 2010). In "Low income" tropical nations like Togo, with threatened Indigenous populations, crop yields of the primary maize subsistence crop and others in the nation and sub-Saharan Africa are drastically lower than in more "developed" nations (George, 2014). Between the nations of sub-Saharan Africa, the maize yield gap (Owusu Danquah et al., 2020), which is the difference between projected yield and actual yield, is extensive and varied between more "developed" and "developing" nations (Dzanku et al., 2015; van Ittersum et al., 2016) For example, the maize yield gaps in sub-Saharan African nations like Ghana (Owusu Danquah et al., 2020) (1991 to 2012: 6.9 tons harvested per hectare), Mali (1991 to 2012: 7.8 tons harvested per hectare), and Ethiopia (1998 to 2017: 11.1 tons per harvested hectare) are much higher than nations like the United States (1981 to 2015: 2.8 tons per harvested hectare), China (1985 to 2014: 3.5 tons per harvested hectare), and Germany (1995 to 2011: 1.3 tons per harvested hectare) (GYGA, n.d.).

In reality, the current yield gaps facing farmers in West Africa threaten the everyday livelihoods of threatened Indigenous communities at present more than the slowly mounting impacts of climate change, like temperature increases, which will compound these yield disparities in the future (Defrance et al., 2020; Dzanku et al., 2015; Mueller et al., 2012);

however, climate models are not absolute predictions. For example, Defrance et al. (2020) note the importance of reducing "water stress" for rainfed agriculture in West Africa, stating that,

> Due to this high variability of environmental constraints and evolutions perspectives, especially for rainfall, analyses and actions related to food security, adaptation and resilience to the impacts of climate change must be carried out by distinguishing homogeneous zones combining the evolution of key factors impacting yields and must then be adapted, if necessary, to administrative scales: spatialized crop models are particularly suitable in this context. (p. 11)

Still, results of climate change are already reported by Indigenous communities, such as extreme and violent weather events, (Nyamangara et al., 2013; Ofori-Sarpong & Asante, 2004a, 2004b; Tambo & Wünscher, 2017; Yegbemey, 2020), and I witnessed similar changes in Togo.

West African Indigenous smallholder societies are clearly vulnerable to climate change and food insecurity. What remains to be seen is how communities will overcome these threats. Therefore, resilience theory rose to prominence for its potential to aid communities in preparing and adapting to future food system perturbations (Alinovi et al., 2010; Bizikova et al., 2016; Cabell & Oelofse, 2012). Holling (1973) developed ecological resilience theory based on the ecological paradigm shift from stability state to non-equilibrium; this shift recognized that ecosystems are inherently non-static and non-linear (Berkes, 2007b; Cabell & Oelofse, 2012; Curtin & Parker, 2014; Darnhofer et al., 2011; Folke et al., 2010). There is research support for a resilience approach to food insecurity (Alinovi et al., 2008; Béné et al., 2016; Guyu & Muluneh, 2015; Lebot & Siméoni, 2015). Resilient food systems require flexibility, redundancy, diversity, coping mechanisms, responsive and resourceful stakeholders, and informed decision-making institutions (Bizikova et al., 2016). Agricultural management must adapt to ensure context specific resilience to climate, social, political, and economic changes, but can also contribute to or detract from food system resilience (Jacobi et al., 2015; G. Martin & Magne, 2015; Sieber et al., 2015). For example, organic management of maize increased food security from six to nine

months of the year in Zambia (Auerbach et al., 2013); elsewhere in Africa, many farmers are misinformed about how to improve soil organic matter, relying on mineral fertilizers that further deteriorate their soils (Tittonell & Giller, 2013), as is the case in Togo. Resilience has been highly debated in the literature because theoretical and empirical applications of resilience theory are insufficient for wide scale applicability and replicability (Béné et al., 2016). Yet, use of ecological resilience theory to analyze context-specific food systems is growing because of its ability to reconcile disparate disciplines and peoples (Béné et al., 2016), as it did in this dissertation.

Ensuring access to safe and healthy food as a basic human right requires health of the whole food system (social and ecological) (Bizikova et al., 2014; FAO, 2004), including biodiversity conservation (Altieri, 2004; Thrupp, 2000), political and economic stability (Altieri, 2002; Pert et al., 2015; Vanloqueren & Baret, 2009), research support (Gruber, 2020; Kibler, 2020), supporting policies and resources (Bizikova et al., 2016; Foran et al., 2014), and vital intergenerational Indigenous knowledge (Berkes et al., 2000; Lal et al., 2015; Lwoga et al., 2010). The social-environmental link is inextricable and I cannot sufficiently research and understand a food system without also understanding the social dynamics and culture guiding it (Folke, 2006; Foran et al., 2014). Through this realization, I opened myself more to the people of Bikotiba throughout my years with them, including this research, and learned about their society, culture, and challenges. I saw them face drought and seasonal hunger, I helped them give birth, I harvested maize with them, I ate meals with them, I drew water from the well with them, I celebrated holidays with them, and I mourned deaths with them. My biased and naïve hope that the world will be a better place than today when Baby Saye is my age, my relationships with the people of Bikotiba, and my knowledge of their food security challenges inspired this dissertation

and the story of perseverance, family, morality, struggle, culture, life, and death I will tell you herein.

This Dissertation

My goal in study was to engage participants in Bikotiba, Togo, in generating new knowledge so they could best understand threats to their food system. I only assume that understanding generated from this study could be generalizable across scales of this context specific, case study system (i.e., from household to community), and not beyond this community. However, others could learn lessons from our methods and this conceptual framework for decolonizing Indigenous food systems research. The truth and reality through my eyes described herein are context specific and based on the history and experiences of this subset of society, in which understanding of this problem was generated (A. Abdi, 2007; Semali & Maretzki, 2004; Simonds & Christopher, 2013; Twikirize & Spitzer, 2019). My overarching goal for this dissertation was to decolonize my interactions with Indigenous participants to understand household agricultural food access in Bikotiba, Togo. Thus, in this dissertation I present three standalone publishable(ed) manuscripts to answer the following research questions and accomplish their associated objectives:

Chapter II: Reflexions on Feminist Decolonizing Research

> *Question:* How can synthesis of feminist and decolonizing worldviews allow a well-trained Western researcher to engage an Indigenous community ethically?
>
> *Objective:* Use feminist and decolonizing principles to engage participants in designing and implementing an interview tool with households in Bikotiba.

Chapter III: Case Study: Resilience to Food Insecurity in Bikotiba, Togo

Question: What opportunities arise when an Indigenous community supports research?

Objective: Understand how a community like Bikotiba, Togo, supporting decolonized Western research can foster new knowledge generation and opportunities for adaptation to climatic, environmental, and social changes threatening them.

Chapter IV: Household Agricultural Food Access in Bikotiba, Togo

Question: How can understanding household agricultural food access help identify leverage points in families' and the community's food system.

Objective: Employ an interview with heads of households in Bikotiba to identify food access leverage points in the community.

While these three manuscripts are standalone, the appendices of this dissertation are referenced throughout all chapters and would be considered as supplementary materials for publications. I conclude with a fifth chapter called Storying the Research, in which I try to portray, from my perspective, the complex realities facing the people of Bikotiba that impact their generational food security, and I discuss implications and opportunities from this research.

Chapter II – Reflexions on Feminist Decolonizing Research

Author's Note:

This chapter is presented as a standalone manuscript.

The views expressed in this chapter do not represent the views of the United States Peace Corps.

Reflexions on Feminist Decolonizing Research

Abstract

Historically, Western (i.e., non-Indigenous) research paradigms have oppressed Indigenous collaborators and their knowledge. Whether and how these non-Indigenous researchers can ethically engage Indigenous collaborators has been debated. Decolonizing methodologies have evolved and advanced this discourse. Still, in many contexts today, Western scholars initiate studies with Indigenous communities to advance their own research agendas. These interactions perpetuate the scholars' inherent colonial power and privileges, can harm Indigenous participants, and threaten research validity and ethics. Even Western research designed on the foundations of participation and relationships have the potential to oppress participants. Thus, Western scholars must design pluralistic, or multidisciplinary, research to ensure they have the tools to engage Indigenous participants ethically. To foster ethical research between Indigenous peoples and Western scholars, researchers of any discipline should adopt decolonizing methodologies and feminist principles. In this manuscript, I use my experiences synthesizing decolonizing principles and feminist theories, specifically radical vulnerability, radical empathy, and reflexion. I argue that if scholars embrace these principles, then there could be ethical opportunities for well-trained Westerners in decolonizing research. This discussion is meant to engage Western scholars of any discipline working with Indigenous collaborators. I also hope to stimulate further discourse between Indigenous and non-Indigenous members of the academy on the opportunities for ethical feminist decolonizing research.

Key Words: Indigenous, Neocolonialism, Participation, Radical Empathy, Radical Vulnerability Togo

Introduction

Indigenous scholars, like Linda Tuhiwai Smith, Chika Ezeanya-Esiobu, and Frances Owusu-Ansah, write most literature on ethical decolonizing methodologies. This is logical because these scholars are intimately aware of the unjust Western forces that have dominated theirs and others' peoples. *Indigenous* societies like Bikotiba, Togo, are relational, with peoples owning valid historical, local knowledge and experience of their environment and society (Chilisa, 2012). These Indigenous societies have been colonized in some form for centuries and are colloquially called "developing" or "low-income." Alternatively, in this manuscript, *Western* refers to so-called "developed" or "high-income" societies in the Global North, or historic colonizers (Pashby & Sund, 2020). *Developing* means a nation or community actively seeking social, economic, and political advancement to alleviate poverty (A. Abdi, 2010; Gurtoo & Williams, 2015). This status is often based on assumed superiority of developed nations, like America, as models (Gurtoo & Williams, 2015; L. Smith, 2012). However, most development efforts have occurred without Indigenous input and harmed Indigenous societies (e.g., cultural destruction through imposition of a globalized[5] "formal" language, like French) (A. Abdi, 2010). Scholars like Paul Nadasdy (1999) question whether Western researchers have the right or ability to ethically *study* Indigenous people; he asserts that most Western influences want to *take* Indigenous knowledge and culture for their own agendas (e.g., a highly cited journal article); I agree that this has been evident throughout the literature. Therefore, to counter unjust Western influences, other scholars prescribe decolonizing methodologies as a way for Westerners to engage Indigenous collaborators ethically (Crothers, 2014; L. Smith, 2012). I embraced

[5] *Globalization* is how Indigenous populations were/are encouraged to accept the cultures, education, politics, and economics of the Global North to alleviate poverty (A. Abdi, 2010; Pashby & Sund, 2020). However, globalization benefits the globalizers, perpetuating neocolonialism and dispossessing Indigenous communities (A. Abdi, 2010).

decolonizing methodologies while collaborating with the Indigenous community of Bikotiba, Togo.

If a Western scholar like myself hopes to interact ethically with an Indigenous community, they should practice consistent *reflexion*: a real-time and continuous process of questioning our research objectivity and challenging ourselves existentially (Chilmeran & Hedström, 2021; Riach, 2009). Reflexion is a feminist principle different from *reflection*, or assessing an experience like research within a specific time frame after it occurs (Riach, 2009). As Lorraine Nencel (2014) explains, reflexion is a feminist ethnographic decolonizing principle of no *true present* in which to deconstruct our research actions or *simple relationships* between data and the world from which it appears. Nencel (2014) adds that, "Reflexive analysis and practices are intimately related to the researcher's epistemological standpoint" (p. 76). Researchers' beliefs about how they could learn from Indigenous collaborators guide if and how they would practice reflexion (Nencel, 2014). Richa Nagar (2015) and Nencel (2014) note that reflexion is necessary for cross-cultural scholars to be both radically vulnerable (i.e., researching with critical reflexion on actions of power) and radically empathic (i.e., developing and acting on research relationships with compassion and respect guiding all actions with Indigenous collaborators), respectively. I argue that combining these feminist techniques with a decolonizing worldview is the best way for Westerners to engage Indigenous participants ethically.

In 2017–2018, I built on my prior two-year relationship with the community of Bikotiba, Togo as a United States Peace Corps volunteer to conduct participatory co-research of the community's food system. My predefined relationships of trust and long-term engagement with the community from those first two years facilitated my capability to decolonize this research relationship to my greatest ability. Based on political divides explained to me in advance and to

maintain possible impartiality in the research, I asked each of the three village districts to nominate one male and one female Research Assistant (RA) (Appendix E) who were French reading, writing, and speaking literate, and interested in being leaders in their community's food security; RAs were paid a moderate Togolese wage for their time. Still, a notable limitation of this interview process was translation between three languages, of which accuracy and continuity were challenging because of each language's nuances, particularly the lack of direct translations for many words and phrases from the local language, Bassari, to French. We did not use our time to construct uniform translations for each interview question, as might be considered ideal by some. Such uniformity was impossible between these three languages within our time constraints. Instead, we followed the lead of Lavrakas' (2011) Encyclopedia of Survey Research Methods entry on *Language Translations,* which is realistic on the challenges of translations between multiple languages. Therefore, we made best practice decisions as a research team, focusing more on the meaning of each question and the numerous ways the question could be asked in Bassari while keeping that meaning. I placed my trust in the RAs and other close local advisors to develop the interview questions together and proceed with careful attention. This study would have been impossible without the participation of dedicated RAs who ensured the cultural, linguistic, social, and technical merits of the interview (Appendix B) we created.

Throughout one month in 2018, I worked with RAs to refine the interview to be methodologically (e.g., focused on one topic) and locally relevant. Most critically, RAs were responsible for translating interview questions and answers accurately. Research Assistants and I revised the interview through pilot processes with each other and participants. Six interview drafts were developed and tested before we finalized a tool for implementation (Appendix B). RAs and I implemented these interviews with 56% of the community. Additionally, RAs and I

led three community meetings, one with students (7) and one with women (35) on climate predictions for the region and potential adaptation strategies, and one that all members of the community were invited (approximately 50 participated) to hear our findings from interviews and meetings; men did not participate in their scheduled meeting due to timing conflicts and potential lack of interest. RAs and I held weekly or bi-weekly meetings to debrief, discuss data, refine our processes, and share knowledge.

In this article, I reinterpret lessons from Nagar (2015), Nencel (2014), and L. Smith (2012) to target Western researchers of *any discipline* engaging with Indigenous collaborators, whether they consider themselves feminists; these are scholars conducting what I call feminist decolonizing research[6] of social-ecological systems. I also endeavor to stimulate further interdisciplinary discourse between Indigenous and non-Indigenous scholars on the place of Westerners adopting these principles in Indigenous spaces. I focus my discussion on sub-Saharan African indigeneity because that is where my understanding lies, with cultural qualities in my experiences such as relationality, celebrations of life, value of the Indigenous language, generosity, value of intergenerational knowledge, and deep spiritual traditions. My goal is not to recount detailed analyses of decolonizing and feminist theories. Instead, I provide examples to demonstrate that the most ethical way Western scholars could collaborate with Indigenous participants is by synthesizing feminist and decolonizing methodologies. With radical vulnerability and radical empathy (RVE), I document my reflexions on experiences as a non-Indigenous feminist decolonizing researcher to a) share my experiences living, collaborating, and

[6] My focus on feminist decolonizing research with Indigenous participants in this article should not be confused with *Indigenous feminism*, which focuses on deconstructing Indigenous gender inequality (Green, 2007). Other scholars discuss decolonizing feminist research overall (McLaren, 2017). There are references to "feminist decolonizing research" and "feminist decoloniz(s)ation" in racial, ethnic, and immigration studies such as Skachkova (2000) and Tate (2019). There is additional focus on *black feminism* in decolonization, meaning the contestation of one common womanhood to decolonize the historically white feminist movement (Matiluko 2020). I have not found a reference to feminist decolonizing research in social-ecological/food systems literature.

researching in Bikotiba, Togo, and to b) demonstrate what Western scholars can learn from decolonizing and feminist perspectives to engage with Indigenous participants ethically. Such multidisciplinary and cross-cultural dialogue could allow well-trained Westerners to engage Indigenous communities ethically by embracing decolonizing RVE to build authentic research relationships of trust and mutual understanding (Appendix A).

Feminist Decolonizing Research

Neocolonialization and Decolonization

Societies colonized historically and neocolonized today through globalization (le Grange, 2018), like Bikotiba, should be cautious of powerful, privileged[7] Westerners. Caution is justified because historically, researchers have sought to use Indigenous knowledge and cultures for Western interests (e.g., taking Indigenous knowledge under false pretenses of ethical, locally relevant research) (Chilisa, 2012; Nadasdy, 1999; L. Smith, 2012). Kim (2010) calls neocolonialism a cunning modern perpetuation of colonial worldviews; for example, missionaries in Togo impose Western religious ideologies on Indigenous communities, attempting to deculture centuries-old spiritual traditions. Neocolonialism is dangerous and has often been perpetuated by Western researchers under the guise of respect for Indigenous peoples. However, these approaches are actually practiced without attention to the needs of their Indigenous collaborators or to take Indigenous knowledge (Datta, 2018; Mataira, 2019; Nadasdy, 1999; L. Smith, 2012; Swadener & Mutua, 2008). Colonialism did not end, it morphed into new oppressions.

The role of Western privileges in decolonizing research is a complex grey area that demands further dedication. The historic European (i.e., white) colonization of Africa left

[7] Power is assumed endemic superiority (colonial, imperial, and global) based largely on nationality, whereas privileges are socially constructed advantages (race, gender, and class) of a group of people (Chilisa, 2012; Featherstone, 2012; Nagar, 2015; Nah, 2003; L. Smith, 2012; C. Stephens, 2010).

Indigenous people dispossessed, stripped of their lands and livelihoods, and exploited for their cultures and knowledges (A. Abdi, 2010; Ezeanya-Esiobu, 2019; Wane, 2005). Since African nations claimed their independence throughout the 20th Century, I believe there is a common Western assumption that colonialism ended (Rudi et al., 2012). However, postcolonial theory posits that the effects of colonization still challenge Indigenous populations today (Asongu, 2013; Chimakonam et al., 2014; Matthews, 2012); Kim's (2010) discussion on neocolonialism agrees and I have witnessed neocolonialism at play in West Africa, such as top-down agriculture that does not prioritize the vulnerable producers. Akindele et al. (2001) point out the common Western imperialistic notion that globalization will save the "savage," "other" Africans, with no consideration of what those *not savage* Africans need or want. West African nations have little control over their economies, are in debt to powerful nations, and their resources are exploited by the west, perpetuating poverty (contrary to the theoretical goal of globalization) (Akindele et al., 2001). Globalization clearly just perpetuates African nations' insecurity. Thus, the authors question rightly how colonizers have the right to preach liberation to Africa today (Akindele et al., 2001). Perhaps our privileges contribute to the disillusioned imposition of our worldviews on others. C. Stephens (2010) asks if efforts to improve the lives of the disadvantaged merely further segregate us as facets of society with unequal privileges. Are we just reinforcing their disadvantages (C. Stephens, 2010)?

Some scholars argue that by initiating research with those having fewer advantages than we do, we depict ourselves as "normal" and continue imperializing those with whom we research (C. Stephens, 2010). Western research paradigms are byproducts of scientific colonialism (Ciofalo, 2019), which has been guided historically by three key assumptions of power that I tried to dissuade in Bikotiba by practicing feminist decolonizing research: (a) Indigenous peoples

are primitive and lesser than Westerners (imperialism); (b) non-Westerners are research subjects for Westerners to study (colonization); and (c) Westerners should teach liberal capitalism to non-Westerners because it is superior (globalization) (Chilisa, 2012; Datta et al., 2015; Nadasdy, 1999; Nagar, 2015; L. Smith, 2012). Western researchers have often assumed epistemic superiority, used Indigenous people as research subjects, and compartmentalized and distilled Indigenous knowledge for Western research purposes (Chilisa, 2012; Nadasdy, 1999; Nagar, 2015; Owusu-Ansah & Mji, 2013; Wane, 2005). Colonial history and continued neocolonialism means Western researchers exert power, consciously or unconsciously, over Indigenous participants (Chilisa, 2012; Nadasdy, 1999; Nagar, 2015; Wane, 2005). Western worldviews are imposed on Indigenous societies, which alter the way Indigenous people create and regard their own knowledge (A. Abdi, 2010; Owusu-Ansah & Mji, 2013). Therefore, to deconstruct neocolonial power imbalances, Western scholars must consider imperialism, colonization, and globalization, which are critical in knowledge production, consistently in their methodologies (Chilisa, 2012; L. Smith, 2012). Throughout the 20th century, decolonizing methodologies evolved to engage Indigenous participants ethically and provide an environment where they can use their power (Datta, 2018; Simpson, 2001; L. Smith, 2012; Swadener & Mutua, 2008; Thambinathan & Kinsella, 2021).

Decolonizing methodologies are the foundations of ethical studies with Indigenous collaborators (Chilisa, 2012; L. Smith, 2012). These methodologies embrace the intricacy of indigeneity and provide the only mechanism to share voices of the oppressed authentically (Chilisa, 2012; L. Smith, 2012). Western scholars collaborating with Indigenous participants must respect the inherent validity of non-Western knowledge (Chilisa, 2012), as I did in Togo. To practice decolonization, Western scholars must acknowledge that colonialism is real, take

action to help participants reach their goals, deconstruct Western research paradigms and epistemologies, and provide participants the opportunity for autonomy by embracing Indigenous languages and cultures (Chilisa, 2012). To facilitate decolonization, Chilisa (2012) says that participants must also take action to reach their goals, dream of new possibilities, deconstruct their perceptions of Western research, and seek ontological and epistemic equality (Appendix A). Researchers who seek to decolonize studies via participation must be aware of their responsibilities. For example, Datta et al. (2015) describe decolonizing responsibilities they learned while conducting Indigenous participatory action research (PAR), a decolonizing methodology, in Bangladesh: (a) develop empathic relationships of trust to learn about and minimize risks to participants, thereby fostering co-production of knowledge and social action (Appendix A); (b) transfer power from researcher to participant by sharing community voices as the participants deem valid (participant-researcher reciprocity) (Appendix A); (c) embrace multiple ways of knowing and Indigenous ownership of their knowledge (Appendix A); and (d) practice complex systems theory.

Critiques of decolonizing methodologies are important. L. Smith (2012) questions rightfully whether non-Indigenous researchers could have a place in these methodologies (Fortier, 2017; Picq, 2013). Are these approaches simply neocolonial extensions of past academy failings? Still, many scholars like Datta (2018) think there is a place for well-trained and reflexive non-Indigenous scholars in decolonizing research. I agree with the cautions against Westerners in Indigenous spaces *and* that well-trained, RVE Westerners could act ethically in Indigenous spaces; however, the latter is a powerful and privileged assumption. It is important to question whether decolonizing research by Western scholars perpetuates neocolonialism and minimizes Indigenous realities (Owusu-Ansah & Mji, 2013). Colonialism and imperialism are

evident, for example, when we do not share new knowledge with those who helped generate it (Appendix A). As Crothers (2014) notes, Western scholars rarely confront or question the ethics, morals, or merits of decolonizing methodologies presented by Indigenous scholars. This is likely because criticizing approaches proposed by the people they are meant to serve seems like safeguarding imperialism. They assert that decolonizing methodologies not only counter oppression but also support Indigenous people reclaiming ownership of their cultures as authentic and valuable (empowerment) (Appendix A) (Crothers, 2014). Nagar (2015) questions the notion that Western feminists need to teach the oppressed (specifically women) to be empowered. Expertise itself is a privilege (Nagar, 2015) and Western scholars, including myself during early formal education, have historically minimized "other" knowledge because we believe we have superior worldviews. Thus, Indigenous communities can and should assess Western research efforts like this study critically (Nagar, 2015). These foundations of decolonizing studies (Appendix A) are also common to feminist theories; both schools of thought demand participation to co-produce knowledge (Appendix A) and decolonize research methodologies.

Reflexivity, Radical Vulnerability, and Radical Empathy

Foundationally, feminist researchers like myself seek to understand women's experiences, reflect on transforming patriarchy (i.e., male-dominated society), and reduce female oppressions (Campbell & Wasco, 2000). Feminists argue that field research is a complex process of researcher and participant navigating their differences while trying to co-produce knowledge (Nagar, 2015). Feminism accounts for complexity in the systems in which we study. *Feminist systems theory* draws on critical systems thinking[8] and cultural ecofeminism[9] to challenge

[8] *Critical systems thinking* is a critical approach to complex systems theory (A. Stephens et al., 2010), or recognition that social-ecological systems are uncertain, variable, and delimited by disturbance (Mulder, 2015; Rihani, 2002).

complex social-environmental system oppressions (e.g., top-down environmental management that contradicts the decolonizing principles of re-scaping, returning, and claiming) (Appendix A) (L. Smith, 2012; A. Stephens et al., 2010). Feminist systems theory should: (a) improve society via the intentional actions of participants and researchers; (b) foster relationships of trust and thus an environment where participants can experience relief from injustice (Appendix A); and (c) demand researcher reflexion (Appendix A) on power dynamics in the field (A. Stephens et al., 2010). These feminist principles mirror decolonizing methodologies of seeking justice, healing, and love (Appendix A) (L. Smith, 2012). Pluralistic methodologies, or what A. Stephens et al. (2010) call a combination of multiple theories and approaches to accomplish "people-environment analysis and synthesis" (p. 559) are required for feminist systems theory. Pluralistic, or multidisciplinary, researchers like me are obligated to synthesize theories and methods based on their experiences and skills, which allowed me to value diversity, avoid stereotyping participants, and fulfill my responsibility to address gaps in this research (A. Stephens et al., 2010). These principles align clearly with decolonizing methodologies of participatory actions research (PAR) – participation, emancipation, and mutual understanding (Lawson et al., 2015). Critically, however, some Indigenous scholars do not support methods meant to decolonize like PAR because it is founded in Western research methodologies and paradigms (Le Grange, 2001). I agree and argue that the approach could benefit from greater specific focus on indigenizing the research process.

Researcher reflexion, or reflexivity, is a feminist principle critical in the social sciences to help researchers identify power dynamics in knowledge creation over time (Riach, 2009). Riach (2009) discusses "sticky events" (p. 361) in research, or ethical, cultural, and existential

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[9] *Cultural ecofeminism* posits that women are no more connected to nature than men are; asserting otherwise is a patriarchal attempt to continue dominating both women and nature (Asiedu, 2019; A. Stephens et al., 2010).

challenges that are opportunities for reflexion. Practicing reflexivity in Togo helped me to note real-time challenges, deconstruct those challenges, test my beliefs through discourse with peers, and adapt my approaches to address those trials ethically. For example, reflexion allowed me to explore my consistent, evolving questions about local culture and food security challenges in Bikotiba to support re-scaping of their Indigenous food system (Appendix A) (L. Smith, 2012). Conversations with my Togolese peers and collaborators helped me determine the relevancy of our research theories and methodologies. Research designs, and especially complex feminist decolonizing studies, are more fallible in practice than theory. Even the most trained, empathetic, vulnerable, reflexive, and experienced researchers will face existential challenges when factors beyond their control impede research designs. Honest reflexion, or what Riach (2009) calls "responsible reflexion" (p. 366), is a feminist approach all scholars, regardless of discipline, can learn to further unveil the ethical concerns of representing Indigenous voices.

Nagar (2015) use stories and experiences conducting radically vulnerable feminist field research in India and Tanzania to stimulate reflexion on the complexities of interdisciplinary, mixed methods approaches to feminist theory. Nagar (2015) defines radical vulnerability as deconstructing research contexts by building relationships of trust and using critical reflexion to learn how we can conduct research with Indigenous participants ethically. Nagar (2015) posits, and I argue, that strictly categorized and isolated academic discourse limits research relationships and researcher accountability, thereby perpetuating disunion of theory and practice. I heed Nagar's (2015) call for feminist researchers to take risks on improper translations and relationships that could fail. These risks can reconcile scholarship and activism by using "radical vulnerability and love, reflexivity and risk, translation and coauthorship, as mutually constitutive and interdependent in knowledge making and alliance work" (Nagar, 2015, p. 5). This

vulnerability and evolution could enhance Western researchers' abilities to conduct trustworthy and responsible research with Indigenous participants. Nagar's (2015) radically vulnerable experiences helped guide my attempt at locally relevant, decolonized, participatory research with Togolese collaborators. By embracing radical vulnerability in the field and consistently questioning my conscious and unconscious actions of power, I was able to reflect on and deconstruct my assumptions about the research. This radical vulnerability and reflexion on the implications of my research relationships showed that to collaborate with Indigenous participants ethically, Western scholars do a disservice by not synthesizing decolonizing and feminist methodologies and epistemologies.

Nencel (2014) also discusses reflexivity as they share their experience with prostitution research in Peru and particularly, their experience with radical empathy, self-reflexivity, and positionality in feminist ethnography[10]. Positionality (Appendix A) is when a researcher reveals themself (i.e., class, race, nationality, gender, sexual orientation) and situates their position in participatory research relationships (Nencel, 2014; L. Smith, 2012). Nencel (2014) says that positionality springs from what they call "a politics of radical empathy" (p. 81), which is developing relationships with and representing our research partners with understanding and compassion. I practiced reflexivity throughout this research relationship in Bikotiba through detailed field notes on my experiences and feelings, consultation with trusted Togolese advisors to challenge my understandings of the reality I was being privileged to, adapting my actions along the way to further Indigenize and decolonize the process based on what I learned, and continually considering my actions of power long after this experience. It was also critical that I always explicitly acknowledged my position within the community as a white, United States

[10] *Feminist ethnography* is a mixed-method social science that springs from anthropology and is based on participant storytelling (Craven & Davis, 2013).

researcher trained in the Western academy and to share with participants how I was trying to dissuade my latent oppressive tendencies. Nencel (2014) says that despite critiques of self-reflexivity and positionality being researcher-focused, the value of such reflexion depends on the predefined research relationship; my predefined relationships of mutual trust and understanding in Togo make me agree with Nencel (2014). Nencel's (2014) reflexivity mirrors decolonizing principles of positionality, storying, and love (Appendix A) (L. Smith, 2012). Nencel (2014) asserts that this radical empathy ensures that "feminist research does not become an 'anything goes' practice" (p. 81). They continue saying that, "Self-reflexivity is an essential component for unsettling hierarchies in the feminist research project" (Nencel, 2014, p. 76). When the researcher writes about their experiences vulnerably, then the, "Text becomes a co-constructed space that reveals the interaction between the researcher's assumptions and positionality and the voice, stories, and experiences of the research subjects," (Nencel, 2014, p. 76).

In my view, it is problematic that a seemingly highly reflexive scholar like Nencel (2014) uses language like "research subjects" to describe cross-cultural contributors. This language inhibits decolonizing methodologies of letting go, retracting, healing, and centering Indigenous consciousnesses (Appendix A) (L. Smith, 2012). Perhaps such language is more common in feminist ethnography discourse, but to me it still reads as a position of lower power, turning fellow humans into mere "subjects". Particularly given the sensitive relationship between Nencel (2014) and her Peruvian counterparts engaged in prostitution, would it not be then more respectful to refer them as participants or collaborators? Continuous reflexion and focus on decolonization help to curb oppressive language. Despite these language issues, Nencel (2014) provides a thoughtful, self-reflexive recounting of her research relationships in Peru. Nagar (2015) makes similar linguistically concerning statements when discussing challenges in feminist

fieldwork, particularly how Western researchers can communicate the authentic perspectives of participants. Nagar (2015) calls this as a "crisis of representation" for "feminist research[ers] in third world contexts" (p. 82), which can be reconciled by knowledge production via emancipatory social action in feminist fieldwork. I cannot presume why Nagar (2014) or other scholars, world leaders, and policy makers choose to refer to African, South Asian, Oceanic, and Latin American communities as either "first" or "third" worlds instead of the more modernly accepted "developed/high-income" or "developing/low-income." All of these terms are subjective, judgmental, and created by those with power to make modernization the "right" standard (Kim, 2010; Osai, 2010). The notion that nations need to modernize to be valid internationally is neocolonial. Mohanty, Russo, and Torres (1991) note that use of "third world" is divisive and we cannot deny the colonial and imperialistic implications of this moniker. This article is not the place to deconstruct semantics of how we refer to people we identify as "other" than us. Still, it is important to remember the implications of our language and continue deconstructing our use of these terms, especially as feminist decolonizing researchers working to curb social inequities. I question how Nagar (2015) would overcome the crises of representation they discuss while compartmentalizing participants as "third world" (p. 82).

Radical vulnerability and radical empathy (RVE) demand that Western researchers, no matter how challenging and uncomfortable, consider how all our actions, down to our word choices, could harm the Indigenous communities with which we are privileged to work. While I do not agree with all Nencel's (2014) and Nagar's (2015) statements, I believe they both provide valuable examples of reflexions on well-intentioned, cross-cultural research relationships; they allow others to learn from their challenges and mistakes before venturing into such spaces. Ideally, through such RVE research, future Indigenous communities are not harmed by Western

influence. As a non-Indigenous researcher, I anticipate skepticism when seeking Indigenous participation. I spend significant time questioning the ethical implications of my interactions with Indigenous collaborators in Togo while positioned (Appendix A) as a white, cis-gender, lower-class, formally educated woman from the United States with a history living in the community. While personal skepticism about the ethics of my research may seem like a substantial limitation, I argue it is a sound exertion of my reflexive abilities. I cannot assert that I counteracted the influence of my power and privileges adequately with participants in Bikotiba. I only claim that I used my knowledge of and belief in decolonizing methodologies, as well as my experiences in Bikotiba, to practice RVE and to thus question the impact of my power and privileges in this research.

Reflexions on Radical Vulnerability & Radical Empathy from Feminist Decolonizing Research in Togo

Feminist decolonizing researchers must reflect carefully on how we listen to the truth from other knowledge stories and what we do with that truth (Nagar, 2015) to foster Indigenous discovery, consciousness, celebrating, and storytelling (Appendix A) (L. Smith, 2012). We need to remember our commitment to understanding and communicating diverse lived experiences, but we also need to remember we will never be able to infiltrate that experience (Nagar, 2015). Nagar (2015) presents the following questions common to both decolonizing and feminist theories regarding power, privilege, participation, and context when working with historically colonized participants: (a) If we acknowledge that traditional Western research paradigms will always be responsible, to some degree, for oppressing "other" knowledge, then can ideals like trust, relationships, vulnerability, harmony, and reflexion help us research ethically? (b) Is it possible to treat diverse ways of knowing equitably, without having to compare or legitimize them? and (c) Can we represent knowledge that is not ours objectively, while also honoring

voices of the knowledge producers? Nagar (2015) tells us that reflexive, radically vulnerable researchers must deconstruct their philosophical perspectives and categorize each fieldwork challenge as ethical, ontological, or epistemological. Therefore, to demonstrate lessons for conducting feminist decolonizing research as a Western scholar, I question if I communicated with participants fairly (ethical), if RVE helped me challenge my perceptions of what research should be (ontological), and if I can portray participants authentically through my lens (epistemological). Thus, I heed Nagar's (2015) call to categorize and share examples of my fieldwork challenges in Togo and follow Nencel's (2014) examples of positionality and radical empathy to demonstrate how reflexion and RVE helped me navigate those challenges. Nagar (2015) tells us to be critically reflexive and build trust by allowing participants to explore their mistrust of us. Therefore, to be radically vulnerable, I must be able to share my painful, embarrassing, and existentially challenging experiences (Nagar, 2015).

I lived in the small village of Bikotiba (bih-CO-ti-buh), Togo for 27 months (2011–2013) as a US Peace Corps (PC) Environment and Food Security volunteer, and for four months (2017–2018) conducting a participatory assessment of household agricultural food access (Kibler, 2020). I reflect on my time with the Peace Corps still a decade later, as I learn and argue for decolonizing methodologies and feminist principles. This makes it important for me to position myself (Nencel, 2014) and practice radical vulnerability (Nagar, 2015) to address criticism of the organization briefly in the context of this manuscript.

While one of the most valuable experiences of my life, through which I gained Togolese family and friends for a lifetime, I agree with certain public criticism of the PC. I believe the PC plays its part in neocolonialism under the guise of sustainable development. They send mostly young, inexperienced (e.g., just out of college, me included), and under-trained people into

Indigenous communities with insufficient tools to be truly decolonizing forces throughout two years in a participating country. The PC encourages "capacity building" with Indigenous participants or teaching the same participants "behavior change," as I was urged by PC institutionally during my service, though I did not accept the stance. For example, we were trained for multiple days on how to teach behavior change in our communities as the way to "help" our Togolese collaborators advance. I realized during those trainings that I did not agree it was my place or right to presume I knew anything more than my Togolese counterparts about how their behaviors should change or to presume my capacities were more than theirs established for decades or centuries. Instead, I carried on with a focus on building authentic relationships in my community and supporting the underserved in their goals, when possible, if I possessed knowledge they sought; for example, I shared a successful farming program from Senegal that I experienced with interested farmers who wanted to learn approaches working well elsewhere in West Africa. While decolonization is not the Peace Corps' explicit agenda, volunteers are trained by Togolese counterparts on how to act respectfully in the local cultures. This is the extent of focus on volunteers' ethical approaches to their work and I can attest to some not prioritizing respect for the local cultures. Further, I argue that most Peace Corps volunteers come from upper-middle to upper class backgrounds and have historically been predominantly white, which I argue could challenge one's ability to empathize radically with Indigenous collaborators. For example, many PC volunteers spend their own money to take expensive vacations as breaks from their service and communities. What does this say to communities? Realizing my power and privileges throughout my years in Togo has been a truly reflexive process of decolonial love (Appendix A) (L. Smith, 2012). This is not to say there are no ethical merits to the Peace Corps. I empathize radically with the dedicated Indigenous PC

trainers who guide Americans and with the cross-cultural understanding and skills that volunteers take away from the experience, which can make them better global citizens, if they are open. These reflexions showed me that the relationships of trust I am privileged to in Togo and this research were only possible because my actions, often unknowingly, were guided by my worldviews of RVE and decolonization.

During those first two years in Bikotiba, my Western worldview, ethics, morals, and definitions of success and failure changed dramatically. Western paradigms that oppress people born in the Global South without white skin, which I was trained with throughout my formal (i.e., Western) education, had clouded everything I knew about research. One of the first skills I learned as a cross-cultural collaborator was humility, which is key to practicing decolonial love (Appendix A) (L. Smith, 2012). I understood quickly that pride affects my interactions with Togolese collaborators, sometimes to a detriment; for example, after many years I still bristle when kids sing the "white/foreign person song" and shout the word for white person, *Yovo* or *Anasara*, at me repeatedly, instead of the local name I was given. During my first two years living and working in Bikotiba, what little ego I had was shattered daily as community members stared and mocked my radically vulnerable attempts at communication. Most embarrassment I felt was because my white guilt and empathy left me questioning whether I should be there at all. It was uncomfortable standing out, as all minority groups in this world are intimately aware and as all white Westerners should experience. I was not yet well-adept at meeting my basic needs in a rural village. Community members heard me struggling to learn the local language, saw me washing my laundry by hand for hours, and laughed at my first, wincing taste of local moonshine. I do not believe the mocking was to hurt me, but because my white skin and strange habits were so foreign, while laundry and moonshine are everyday experiences for my Togolese

counterparts from toddlerhood. Still, despite seeing me at my most inept, I think most community members believed I was powerful because of my skin, nationality, formal education, and affiliation with the PC. I was seated honorably with the elder men at community gatherings versus segregated with the other women, for example, until I insisted upon spending more time with my female peers. These are experiences I still reflect on years later to understand better and deconstruct potential harm and epistemic violence I could have caused unknowingly.

When I was welcomed back to collaborate with the people of Bikotiba for this research on food access, I was more experienced and prepared to share my Western knowledge in a decolonized way if the community wanted. I was prepared to hear the community's needs, address those needs within my capabilities, and engage ethically with local collaborators to create a safe space physically and emotionally within the community, where participants could share their knowledge, hear my knowledge, and we could together generate new understandings of the community's complex food system. I was intent to create an environment that minimized my power and respected the inherent value of Indigenous knowledge. The community expressed interest in learning about their food security and welcomed household interviews (Appendix B) to generate greater understanding about tipping-points in the community's agricultural food access (Kibler, 2020). In addition to implementing household interviews (with prior and informed consent; Appendix C) with 56% of households in Bikotiba, Indigenous Research Assistants (RAs) and I led community meetings to share basic climate change predictions for West Africa, also with prior and informed consent (Appendix D). I feel these predictions are under-shared in an accessible way with the Indigenous communities who need the information most to prepare. RAs and I were radically vulnerable together as we fostered community discussions of goals for Bikotiba's future with three groups: women, men, and students. These

demographics were chosen so that people would feel freer to speak among their peers, whereas Togolese women tend to speak less in the presence of men and the same is true for young people in the company of their elders. At the end of the study, RAs and I shared our interpretations of the data with the community and sought their input to validate our understanding (Kibler, 2020).

To ensure some uniformity and sufficient preparation for us all, I led the RAs in a mutual learning process based on the tenets of interviewing expressed by Roulston et al. (2003) (e.g., challenging assumptions and navigating sensitive matters), the discussion of feminist interviewing by Doucet and Mauthner (2008) (e.g., power relations, reflection, empathy, and collaborative knowledge generation), ideas on reporting results from Post et al. (2016) (e.g., structuring arguments to synthesize perspectives and present conclusions to the community), and ethics of confidentiality, honesty, honoring participant voices, and respect as described by the chapter authors throughout Ethics in Qualitative Research (Miller et al., 2012). Ethics were an overarching principle because this interview process also placed RAs in a position of power within the community. I learned as much about successful communication in the community from RAs during this process as they did from me about the "formal" skills cited. It is important to say that imposing these "formal" ideas onto the Indigenous RAs was an inherent exertion of my power as a Western researcher that I accepted as a decolonizing limitation of this study to ensure research validity. RAs acknowledged prior and informed consent verbally (Appendix F) before this knowledge sharing process and anecdotally expressed enjoying the activity, though that could have been what they thought I wanted to hear; I tried to dissuade dishonesty "for my sake" by reminding RAs and participants often how much I valued honesty and would not take it personally, but to improve the research. Scholars (Fitzpatrick et al., 2016; Thambinathan & Kinsella, 2021) have questioned rightfully whether an informed consent process has any

meaning to Indigenous collaborators. I question whether the information I thought participants needed to consent to this process was meaningless for Togolese decision-making. Perhaps telling participants I would report on what I learned from them was insufficient and did not show how I would represent (Appendix A) them.

I am privileged to have built radically vulnerable and empathetic relationships of trust in the village of Bikotiba that helped facilitate this research. I am also not disillusioned about my position (Appendix A) in these relationships and only the community can validate the authenticity of the stories I share. Despite criticism for making myself the subject, I believe that public self-reflexivity in this context is a radically vulnerable opportunity to expand discourse on promising practices in feminist decolonizing research. Therefore, I heed Nagar's (2015) call to deconstruct my ethical, ontological, and epistemological challenges working with Indigenous collaborators in Togo as examples of RVE feminist decolonization in practice.

Ethical Challenge

I believe reflexivity, vulnerability, and relationships of trust allowed me to deconstruct my power, privileges, and role in epistemic violence to engage participants in Bikotiba ethically. For example, I am still analyzing a research relationship that led me to "fire" an Indigenous Research Assistant, Jacques (pseudonym). After months of Jacques' RA peers using our training, skills, and respect for the research process that we developed together (Appendix E), Jacques seemed disinterested in employing our methods. After weeks of benefit of the doubt and frequent reminders about mistakes, I grew wary of his proper execution of the interviews. I also grew to believe he did not respect me as a collaborator based on frequent interruptions and ignored requests. I often saw him disrespecting his female research partner, Angel (self-chosen pseudonym). Disvaluing of women, their thoughts, and abilities is commonplace in the Togolese

patriarchy, though this is not to generalize because many Togolese men do not embrace this trend. I sought the counsel of trusted Togolese peers, elders, and the village Chief, including those who nominated Jacques, to end our research relationship in a culturally appropriate way. This was one of the most uncomfortable and anxious situations of my life, having spent weeks questioning whether this was the right decision, and still questioning it years later. When I told him why I was parting ways, he said that he interrupted his female counterpart because she could not do the interview appropriately, which might have been true. He asked if Angel were "fired" too and I said that we would see if she was ok employing the interviews with the other RAs because I wanted to ensure validity of the data, which was about me, ultimately. During the next week, I learned that Angel was struggling with some of the translations, and I saw the other RAs working with her patiently to accomplish our work together, which demonstrated their radical empathy but makes me question whether I left the RAs fearful I would part with them too. This situation was a complicated exertion of power. Though I believe I acted throughout this challenge with radical vulnerability and radical empathy, I question the authentic reasons for my choices. Reflexions made me wonder what this meant for Jacques (e.g., losing the remaining stipend, knowing he has small children at home or if this would challenge his local relationships) and the community (e.g., would this cause conflicts or would I lose respect and trust) from as many perspectives as I could. Based on those reflexions and the counsel I received, I believe I acted ethically and with RVE in a culturally appropriate way for the research's sake.

Because reflexion is temporally indefinite, I am still deconstructing the ethics of my relationship with Jacques, the harm it may have caused participants and our research, and the role my power and privileges played. Despite internal conflict in the years since the study ended, I am confident that while challenging and imperfect, my actions in this situation were ethical and

ultimately did more good than harm based on the knowledge the community gained from the research toward re-scaping their Indigenous food system (Appendix A) (L. Smith, 2012). My actions demonstrated the seriousness of the research methods and valid data to RAs and others. Still, I question whether this exertion of power could have harmed my relationships with other RAs, despite their telling me I did the right thing, which could have been their placating me. It took time to accept that I did the right thing. My white guilt and concern that I did not do my due diligence to decolonize this process has at times distracted me from the positive outcomes of our research (Kibler, 2020). Had I not designed this as a pluralistic study that synthesized multiple theories from feminism, postcoloniality, neocolonization, resilience, and food systems, combined with radical approaches to the mixed methods of community meetings, interviews, participation, decolonization, and co-research, I would have been tested much more when navigating complex challenges like this one and others. When scholars are open to all possible theories and approaches, especially feminist decolonization, they are better prepared to adapt ethically to unexpected challenges in the field.

Ontological Challenge

Nagar's (2015) points on ontological challenges are relevant because Western scholars are often trained that Western research paradigms are ontologically superior, leaving them unable or unwilling to collaborate outside those guidelines and fostering neocolonialism. RVE feminist decolonizing research is uncomfortable and forces us, as Westerners, to confront our latent oppressive tendencies and do justice (Appendix A) to Indigenous collaborators. As scholars, it is challenging to give up any control of the research process for fear of compromising validity. For example, I was concerned with the quality and reliability of interview translations between the local language, Bassari, and colonial languages, French and English. Participants

helped me realize quickly that there was no one obvious way to translate interviews from French to Bassari. To think there would be an obvious way to translate was my neocolonial assumption. There are too many nuances of Bassari I cannot understand. I was radically vulnerable and trusted RAs to translate honestly and accurately based on the knowledge we generated while developing the interview together (Appendix E), fostering revitalization of the Indigenous language (Appendix A) (L. Smith, 2012). We focused more on translating the meaning of the questions than word-for-word uniform translations (Appendix E). Comparison is human nature, but we do not need to legitimize diverse ways of knowing to treat them equitably. I would have likely harmed the study's validity more if I had forced a specific translation method on participants that they did not deem valid or appropriate. The ontological risk of improper translations (Nagar, 2015) and their potential impact on data may seem like a significant limitation. However, my RVE and the participant-researcher reciprocity that developed as a result were invaluable to curb my power in the research relationship.

Participant-researcher reciprocity, or the strength of our mutual understanding and trust, is essential in feminist decolonizing research, with reciprocity itself being a common value to many Indigenous societies (Amekawa, 2011; Berkes et al., 2000; P. Johnson, 2016; Lal et al., 2015). Such reciprocity and knowledge co-production (Appendix A) help to decolonize research (L. Smith, 2012), allowing participants and researchers to understand each other more deeply, work toward common goals, and develop more meaningful inquiries. However, as Trainor and Bouchard (2013) note, we must be careful in assuming such complicated and nuanced reciprocity and what it means to each person involved. Working through interview development (Appendix E) allowed RAs and I to be RVE together; we learned from each other, saw each other's weaknesses, and built rapport that made our relationships more equitable. While RAs and I were

radically vulnerable together through this process, the nature of our differences and the context means that our roles could not have been equitable. Still, reflexivity tells me that I worked to foster an environment where it was clear that RAs' leadership in interviews and community meetings was the only reason the research was possible, not because of me. The entire process unraveled what I thought research should be, though my Western training still makes me latently question validity in the case of imperfect translations. Ultimately, though, I believe we learned much more about the community through this methodology. This experience was important because it will shape the way I approach future Indigenous collaborations ontologically, should I have the opportunity.

Epistemological Challenge

Nagar (2015) questions whether Western scholars can adopt an epistemology that allows for portraying Indigenous participants truthfully. It is impossible to deconstruct our actions fully and thus, we can only strive to honor and represent (Appendix A) knowledge producers' voices and share our RVE reflexions in an act of decolonial love (Appendix A) (L. Smith, 2012). Beyond differences in our learning styles, it is fair to question whether Indigenous participants and Western scholars can overcome cultural dissimilarities and colonial history to develop mutual understanding. For example, during a community meeting with approximately 30 Bikotiba women to discuss climate predictions for West Africa and possible local adaptation strategies, I had a RVE experience with a participant that led us toward apparent mutual understanding. I was caught off-guard and was not fully prepared to answer when a woman asked me how to grow maize without fertilizer, but it was an exceptionally relevant question. I explained my understanding of the maize (i.e., corn) situation in Bikotiba. I said one day, maize came to Togo and people saw that it produced well. Over time, maize was grown a lot on the

same lands, leaving the soils weaker today and forcing the use of fertilizer to maintain yields. After illustrating the climate change projections for maize in West Africa over the next 80 years, I shared my understanding from the farmers that maize was not adapting to the more frequent droughts. Participants had told me how much the rains had changed over the previous five years. I said that planting trees could alleviate some challenges of drought and other climate changes. I understand that wood is essential for their livelihoods, which I respect, but I suggested planting trees to replace those that must be cut. One woman agreed that trees are good for the rain but said that people keep cutting them to produce charcoal.

Another woman seemed unhappy at this point in our discussion. She said that, "Here in Africa, there is not enough land like there is in America or Europe," before standing and beginning to walk away. I began to respond defensively and paused while the other women talked, knowing it was my responsibility to foster decolonization with the participants. I spoke loudly, with RAs translating to Bassari, to get the woman's attention before she left. In one of my most RVE moments of this research I said,

> I want you to understand that I know I am not African, and I will not pretend to know what it is like to be a Togolese woman. However, I have spent nearly three years since 2011 living here and learning about your agriculture and community. I understand there are land challenges here.

I continued with great vulnerability, saying based on my experiences that,

> I have a hard time believing there is not enough land to plant trees. I see land where trees have been cut that are not being farmed, I see space by the river, I see space in the community garden that is not being cultivated, I see space at your farms, I see space on the mountains. I know there is difficulty with land but for many years I have seen parcels go unused after trees are cut or no longer farmed.

The woman listened to the translation and despite my nervousness as to how she might respond, she thanked me for understanding and said she appreciated my answer and I thanked her for listening. The entire basis of this article underpinned this interaction. I did what I thought was

best to curb my latent, Western oppressive tendencies, trying to show care, empathy, and decolonial love (Appendix A) as I ventured to disagree with an Indigenous participant. Both she and I were vulnerable, empathetic, and challenged existentially as we listened to each other to find mutual understanding, which provided a valuable foundation for deeper conversations with the women.

Westerners must nurture mutual understanding, as I tried, before presuming they could understand anything about an Indigenous community. Even after more than two years learning from the people of Bikotiba, I am limited by misunderstandings, which makes my actions radically vulnerable. Multiculturalists critique liberal attempts at a unifying global culture (Chimakonam et al., 2014; Phillips, 2007) and scholars question if power can be decentralized when integrating Indigenous and Western knowledges (Appendix A) (Nadasdy, 1999). These critiques parallel my epistemic challenges in this research relationship. Mutual understanding and reciprocity are unquantifiable. No matter our social constructions of the world, we cannot know if what we perceive as understanding is real. Western researchers may believe our perceptions and representations (Appendix A) are just and valid. Perhaps, though, we are just exerting our power by thinking we *can* develop rapport across cultural divides. Even reflexion has not given me confidence that what I assume was mutual understanding in this research relationship was not my unconscious attempt to portray a relationship I wanted to exist but did not actually. Inability to make this distinction could be enough to argue, then, that the researcher should not initiate the relationship. Still, I believe there is a space for experienced, well-trained RVE Western scholars in decolonization research and discourse, as Indigenous peoples deem valid. This belief itself may be an unconscious attempt at oppression and demonstrates the complexities in cross-cultural research. Still, my RVE deconstructing this research relationship

demonstrates how Western scholars can engage Indigenous participants toward decolonized mutual understanding.

Concluding Reflexions

This dialogue has been a demonstration of self-reflexivity and radical vulnerability and empathy (RVE) (Nagar, 2015; Nencel, 2014). Despite contestations of self-reflexivity (Nencel, 2014), this experience still occurred, participants and I were radically vulnerable and empathetic together, and we did reach some degree of reciprocity despite interpersonal challenges. Together, participants and I generated new knowledge (Kibler, 2020) to help the community adapt to climatic changes and reclaim their Indigenous food system (Appendix A). If I misunderstood my relationships in Bikotiba, then my depiction of these interactions is unjust. Knowing participants provided prior and informed consent gives me more confidence because they had a choice to share information with me that was open to interpretation[11]. Still, participants did not likely anticipate I would deconstruct our interactions publicly through my lens in a way that could misrepresent (Appendix A) them and neither did I at the time, though I will send this paper to the community for validation; ideally, I will deliver it myself in 2022. While our consent script did say I would share our collective story through my eyes so others could learn from our experience, it was a privileged assumption to think I knew how participants would understand this. This focus on radical vulnerability (Nagar, 2015) developed during my time in the field, when I learned about the concepts in theory and practice. Thus, my approaches were clearly fallible. Still, even fallible approaches practiced with the best intentions to decolonize the research process are important, though the concerns that could arise over this perspective are not

[11] Note: as the intention of this study was to generate knowledge to aid the community's decision making, and no results would be extrapolated to draw conclusions about other populations, this study did not meet the standard of "research" and was deemed exempt by the Institutional Review Board at Antioch University New England. (Appendix G).

lost on me. It is tempting to avoid reflexion because we fear judgment and ethical questions due to colonial history (Nagar, 2015). Building one's reflexive capacities to practice decolonial love (Appendix A) (L. Smith, 2012) is difficult, uncomfortable, and confronting (Nagar, 2015), as it was for me. Still, Nagar (2015) is correct that this reflexion is critical when researchers cross borders, and any attempt at authentic representations of participants' voices must be rooted in reflexion, as I did in this manuscript. Though we must also acknowledge that we can never fully understand the complexities of fieldwork, and thus never be fully reflexive (Nagar, 2015).

The people of Bikotiba did not seek me out for this project, I sought their participation; this action itself was a powerful one. If I never approached them to conduct this research, ethical challenges would have never occurred, and thus participants would have faced no harm. I cannot claim that my methods, as they developed in Bikotiba, were decolonizing or did no harm to participants. Challenges mean we must adapt abruptly and might not make the best decisions despite RVE intentions. However, reflexions allow us to assess those decisions and continue enhancing the ethics of our research and allow us to safeguard the most culturally relevant, authentic, and decolonized research designs. Developing relevant local solutions is easier when we assess systems comprehensively over time and I have the distinctive chance to continue exploring new, significant aspects of this food system with the people of Bikotiba, if they choose.

No matter how well we understand the dynamics of power and privileges, it is impossible to design ideal feminist decolonizing research, especially as Western scholars (Oparah & Okazawa-Rey, 2016). Reality dictates that morals, ethics, and power will complicate and change our research despite researchers' best intentions. Radical vulnerability and radical empathy allow us, as feminist decolonizing researchers, to resist injustice and recognize that we can learn about

participants but never relate to them entirely, but that does not mean empathy should not guide us. Like Crothers (2014), I question if my research in this specific Togolese context is too unique to demonstrate the need for feminist decolonizing methodologies in Western research paradigms. Still, I argue that radically vulnerable and empathetic dialogue in the Western academy could create more opportunities for Western researchers to position (Appendix A) their power and privileges (Nencel, 2014; L. Smith, 2012) to cultivate ethical feminist decolonizing research in practice.

Conversations are not stories we transcribe, but experiences that alter our perceptions of the world (Nagar, 2015). The purpose of this article was to stimulate feminist decolonizing research discourse by describing authentically how I understand my research relationship with the people of Bikotiba. In this article, I shared some of my experiences with radical vulnerability and radical empathy in Togo and demonstrated how reflexion allowed me to foster feminist decolonizing methodologies, adapt to challenges in the field, and develop mutual understanding with Indigenous collaborators. Further empirical examples of feminist decolonizing research like the one I shared here, from scholars of all disciplines, are critical to help expand this discourse. Thus, I believe there can be an ethical place for well-trained and thoughtful Western scholars in research with Indigenous participants, if negotiated (Appendix A) carefully. That place, however, should only be open to radically vulnerable and radically empathetic, reflexive feminist decolonizing researchers, as considered valid by Indigenous peoples.

Chapter III – Case Study: Resilience to Food Insecurity in Bikotiba, Togo

Author's Note:

This case study was published spring 2020 in the book, Building Community: 12 Principles for a Healthy Future. Permission for reproduction in this dissertation can be found in Appendix G.

This case study references 12 principles described elsewhere in the book, which can be found here: https://howcommunitiesthrive.weebly.com/twelve-principles.html. This case study is housed under Principle E: Support Research.

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This chapter remains formatted as it was published, deviating from the rest of the dissertation document, including references as footnotes.

Prologue

Bikotiba, Togo presents a compelling example of an indigenous community working to understand the impacts of climate change pressures. This historically colonized, developing community contends with a corrupt national government, indigenous political divides, disappearing natural resources, and unpredictable climatic changes. The people of Bikotiba recognize their climate pressures, but lack the support to mitigate food system challenges and adapt to those pressures over time.

Community members and I sought to assess families' resilience to food insecurity (the ability to overcome threats to food access, availability, and use[1]). Five research assistants and I developed, tested, and then implemented a system of interviews with over half of the homes in Bikotiba. The participatory decision-making process I describe in this case was necessary to create and employ *locally relevant* interviews. Ultimately, this participatory decision-making process allowed this research to best address the community's needs and demonstrated the relevance of the 12 community leadership principles described in this book.

Introduction

I arrived in Bikotiba, Togo in 2011 as a United States Peace Corps Environmental Action and Food Security Volunteer, per request by the community. I lived in the village and integrated into the community to share technical skills and build relationships; thus advancing mutual understanding between the U.S. and Togo[2]. I arrived in Bikotiba well-intentioned and motivated, but inexperienced as a community partner. For two years I lived with a family, and gardened and farmed with community members. By the end of those two years, I was still well-intentioned, I

[1] Livia Bizikova, Stephen Tyler, Marcus Moench, Marius Keller & Daniella Echeverria (2016). "Climate Resilience and Food Security in Central America: a practical framework." *Climate and Development* 8 no. 5: 397-412. doi: 10.1080/17565529.2015.1064806.

[2]This study does not represent the views of the United States Peace Corps.

was newly motivated, and I had greater experience as a cross-cultural partner. For example, I helped women gardeners receive a grant to fence their land and thus protect their income. Some mistakes, embarrassment, and feelings of defeat along the way helped me develop humility, genuine relationships of trust, and thus a basic but privileged understanding of Bikotiba.

Four years later, the community welcomed me back as a researcher. I spent those years away strengthening my capacity to ethically work with indigenous participants to understand complex food systems. Upon return, the community and I recognized that we could work together in sharing and creating knowledge about their food system. Volunteer research assistants (RAs) and I developed a participatory research process to best assess the community's food challenges.

General Overview & Presenting Situation

Bikotiba is a rural village of approximately 1,600 people in the small West African country of Togo – which is home to nearly eight million people[3]. The French colonized Togo in the early 1900s, until Togo gained its independence in 1960[4]. The national language is French while the local language in Bikotiba is Bassari, representing the Bassar city (Figure 3.1) and ethnic group. Togo's economy has grown in recent years (4.7% in 2018[5]), due largely to international aid[6] that a wealthy minority monopolizes[7] from the extremely poor rural majority[5]

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[3] Bonfoh, B., Todje, A., & Gbakenou, K. I. (2016). *Status of Agricultural Innovations, Innovation Platforms, and Innovations Investment- 2015 PARI project country report: Republic of Togo*. Accra, Ghana: Forum for Agricultural Research in Africa (FARA). https://research4agrinnovation.org/wpcontent/uploads/2017/01/Togo_InnovationStudy.pdf

[4] "Togoland | Historical Colony." Encyclope dia Britannica. Accessed August 2017. https://www.britannica.com/place/Togoland.

[5] "The World Bank in Togo," The World Bank. Last modified March 22, 2019. https://www.worldbank.org/en/country/togo/overview.

[6] Kohnert, D. (2016). *Togo: political and economic development (2013 to 2016) [Author's extended and up-dated version of 'BTI 2016 – Togo Country Report'].* Gütersloh, Germany: Bertelsmann Stiftung. https://www.researchgate.net/publication/270451569

[7] Pingali, Prabhu, Luca Alinovi, and Jacky Sutton. "Food Security in Complex Emergencies: Enhancing Food System Resilience." *Disasters* 29, no 1 (2005): 5-24. doi: 10.1111/j.0361-3666.2005.00282.x.

(living on $1.90 or less daily[8]). The Organization for Economic Co-operation and Development lists Togo as an impoverished fragile state and in 2013 rated Togo lowest in overall life satisfaction of the 149 countries studied[5].

By 2030, 90% of global citizens living below the poverty line will reside in sub-Saharan Africa[9]. Further, between 2030 and 2050, studies predict that citizens living below the poverty line in West Africa will experience severe crop failure because of unpredictable rainfall, higher temperatures, and strained water resources[10]. Before our research study began, farmers in Bikotiba increasingly told me about unpredictable and intense rainy seasons, resulting in crop losses, financial burdens, and increased labor demand; which is consistent with climate predications for the region as demonstrated in neighboring Ghana and Burkina Faso[11]. In Togo, the staple subsistence crop is corn; which participants in Bikotiba eat for most meals. Participants (average age: 47) told me that corn production boomed to an unsustainable scale throughout theirs or their parents' lifetimes; which is consistent with evidence of corn production as far west in Africa as Togo in 1959[12], when corn thrived in Togolese soils. Participants say the possibilities corn offered decades ago resulted in unchecked production. This weakened soils and thus stimulated deforestation in search of fertile land. Participants still sought corn production decades after soils were stripped of nutrients, which is when chemical fertilizers came into play.

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[8] "World Development Indicators, Country: Togo" The World Development Indicators Database – The World Bank. Last Modified April 24, 2019. https://databank.worldbank.org/data/views/reports/reportwidget.aspx?Report_Name=CountryProfile&Id=b450fd57&tbar=y&dd=y&inf=n&zm=n&country=TGO.

[9] Divyanshi Wadhwa, "The number of extremely poor people continues to rise in Sub-Saharan Africa," *The World Bank*" (blog), https://blogs.worldbank.org/opendata/number-extremely-poor-people-continues-rise-sub-saharan-africa.

[10] "The State of Food and Agriculture: Climate Change, Agriculture, and Food Security" The Food and Agriculture Organization. Last Modified 2016. http://www.fao.org/3/a-i6030e.pdf.

[11] Rüdiger Wittig, Konstantin König, Marco Schmidt, and Jörg Szarzynski. "A Study of Climate Change and Anthropogenic Impacts in West Africa." *Env Sci Pollut Res* 14, no 3 (2007): 182–189. doi: 10.1065/espr2007.02.388.

[12] Frank Willett. "The Introduction of Maize into West Africa: An Assessment of Recent Evidence." *International African Institute* 32, no 1 (1962): 1-13. https://www.jstor.org/stable/1157291.

The introduction of these chemicals continued the cycle of soil depletion, land conversion, and poverty.

The Togolese people struggle with many economic challenges and livelihood threats. They have been described as the unhappiest in the world[5]. However, I counter this with the joy, celebrations, cultural pride, and unbiased hospitality that I have experienced. When I walk through Bikotiba I hear laughter and joking, I see children singing and dancing, and I see acceptance to the degree that blood relation is a minute aspect of what makes a family. When I walk through Bikotiba, I am rarely called *Anasara* (Foreigner), indicating likely mistrust. More often, I hear children shouting *Saye*, the Bassari name the community gave me, which means "the second daughter." Or I hear *Tante* (Aunt), *Soeur* (Sister), or *Fille* (Daughter) – names that generally imply respect, trust, and friendship.

I have also witnessed some of the community's food challenges. When I walk through Bikotiba, the children that I see singing are often malnourished, and stop to grab breakfast with dirty hands. People return to town carrying atop their heads a 50-kilogram (110 pound) sack of corn, or logs heavier than I can imagine; they arrive having walked to and from the farms that are on average 8.6 kilometers away (5 miles).

Since 2011, participants have reported climatic changes. Which when asked, 82 of 125 participants defined it generally as scarce, unpredictable, or violent rain. This overwhelming concern about rain is logical because their livelihoods depends on it.

My first two years in Togo led me to continue research on their climate and food security challenges. I returned to Bikotiba four years later with a better understanding about food systems and an enhanced capacity to ethically engage – as well as reengage – stakeholders. Willing participants and I then set out to explore threats to their food access, together (Figure 3.2).

Figure 3.1: Image of Bassar, Togo (photo credit: K.M. Kibler)

Figure 3.2: Images of participants demonstrating farming techniques (photo credit: K.M. Kibler[13])

Goals, Approaches, & Challenges (with Key Principle(s) shown as a letter(s) in parenthesis)

Leaders in Bikotiba have sought assistance often to help with farming challenges, such as requesting Peace Corps Volunteers. When I approached the community to conduct this research, I distinguished clearly my role as a researcher and my past role as a volunteer (D). As a volunteer I was dedicated to the community's needs, but as a researcher I also had personal goals. I explained that my goal was to understand their food access and farming challenges, and that my hope was to arrive at this understanding together. I added that I would share what we

[13] Photo with the participants' verbal consent to take and distribute.

learned so other communities and scientists can learn from them, too (B-D). In light of the weather changes that they described to me, they were eager to identify the aspects of their food system that were making it harder to adapt to a changing climate. Participants and I set out to understand the threats to their food security, to share their stories, and to advocate the need for participatory decision-making research in communities (A-E-F-J-L).

This case study is not a perfect example of including participants in all parts of research. I proposed this study to the community, for example, and they did not participate in the statistical modeling of resilience for my research. Still, this study importantly fostered participatory decision-making to generate, implement, and understand *locally relevant* research of Bikotiba's food system (A-G-J). To accomplish this goal, at my request the community nominated six volunteer research assistants to work closely with me in this study (A-D-F-G-I-J). I first developed the assessment tool—a household interview—alone based on my knowledge from two previous years living in Bikotiba. Then over the course of one month, the RAs and I practiced the interview with each other and community members (E-H). We revised the interview six times before settling on an acceptable draft to implement (H-I-J). The RAs worked to translate the intent of the interview questions (French) in language (Bassari) they agreed was most relevant to participants. This drafting and practice process taught us a few important things:

1. My understanding of Bassari culture and society was significant but I still had much to learn, and always will. Sometimes researchers enter communities and spend little or no time getting to know the community personally; participants in Bikotiba expressed their familiarity and discomfort with such approaches. Without years building relationships in the community (G), it would have taken far more than six drafts to arrive at the final

interview; I would also not likely have been welcomed into homes as readily, among other challenges.

2. In a participatory research process, when developing an assessment tool such as an interview, it is important to practice the interview with a few community members; this ensures it is relevant to the participants (F-G-H) and that all questions are clear. Researchers should budget sufficient time in their designs to test methods and assessment tools with participants.
3. Developing locally relevant assessment tools (G), when participants communicate across multiple languages[14], will require more time; this ensures participants and researchers have developed a sufficient mutual understanding despite communication challenges (A-D). Many participants do not speak French and my French skills are imperfect as well. Thus, developing locally relevant projects means all stakeholders spend time developing a common language and understanding (B-D).

Once we settled on an interview that was relevant to both our research and community needs, RAs and I spent the next two months visiting 125 (or approximately 56%) of the homes in Bikotiba. Adult residents consented to questions about their family, farming methods and challenges, income, and other topics on food access. We ended each interview thanking participants in Bassari (which I speak and understand intermediately) and reminding them about upcoming community workshops, where we would discuss what we learned from the interviews (D-G).

In addition to generating data, it is critical for participants to validate data interpretations (A-G). Participants and I collaborated daily to develop the interview, implement it, and try to

[14] Anne-Wil Harzing and Martha Maznevski. "The Interaction Between Language and Culture: A Test of the Cultural Accommodation Hypothesis in Seven Countries." *Language and Intercultural Communication* 2, no 2: 120-139. doi:10.1080/14708470208668081

understand the results (A-B-G-J-K). I analyzed data along the way and RAs helped to confirm or offer insights to improve my interpretations (A-J-K). For example, RAs helped me to understand that participants cite the seminomadic Fulani tribes as crop pests (just like caterpillars), claiming they steal from the fields and let their cattle damage crops. When the study concluded, we invited the community to hear what we learned from the interviews and asked participants to confirm or correct how we understood the data (D-G-H-J-L). I believe this validation process enhanced the community's overall trust, appreciation, and interest in the research.

The greatest challenges in this case were social. When I returned to Bikotiba after four years, I was surprised by the degree of social divisions that existed in the community. I learned that during my time away disagreements arose because of tensions between the three districts that make up Bikotiba. The district designated as the village's chiefdom is not supported by the other two. It became clear that despite sharing traditional cultural values, this community has been at odds for a long time. Unfortunately, these political divides limited this study's implementation and scope. Young men at the students' workshop expressed their elders' stubbornness in finding agreement over community issues. While this participatory research has encouraged some to find common ground, challenges managing conflict remain as an obstacle (A-J).

Outcomes

In a final community gathering, RAs and I shared key takeaways from the interview process using images (Figure 3.3). Images were essential because a majority of the population is reading illiterate. Participants appreciated the humility in my poor drawing skills and they related to the images as RAs spoke in Bassari in more detail about key takeaways. We asked participants to share their reactions to our interpretations. RAs and I demonstrated that the four primary concerns community members expressed in the interviews were social disagreements, scarce

rain, depleted soils, and the demand to treat corn with fertilizer. RAs and I outlined actions that the community could take in mitigating some of these concerns. Based on what we heard during the interviews and workshops, these included reforestation, gradual return to predominantly eating traditional crops (millet, sorghum, cassava, and yam) versus chemical intensive corn, and efforts to rebuild social cohesion.

I hope to follow the community's progress over time and continue our research partnership. Still, the lasting impact of this participatory assessment for the community is intangible. The greatest takeaway I identify from this process is the new knowledge generated through the participatory research process. Participants were interested in the interview results, particularly our observations about corn production. For most families, corn comprises three meals per day, and is yet the only crop requiring chemical fertilizers to meet yield requirements.

Overwhelmingly, 108 of the 125 participants agreed that corn is drought-intolerant. We asked participants how their parents farmed to understand how farming has adapted over time. Of the 125 participants questioned, 15 said their parents did not grow corn, 25 said parents did not use fertilizer, and 17 participants said their parents farmed only for food to eat rather than for making a profit. In personal conversations, most participants told me that when corn was first introduced it became so abundant (and lucrative) that their generation stopped producing more drought-tolerant traditional crops. Over time with intensive corn production, soils were depleted and now corn requires expensive chemical fertilizer to achieve much lower yields. Even though crops like millet and sorghum are more reliable, behaviors are hard to change. Most participants just do not like the taste of traditional crops anymore. From what we gathered, the people of Bikotiba cumulatively do not seem ready to shift their farming practices. Though I believe

positive individual participant efforts grew from this experience, this community will require longer-term, local support services pointed toward challenges identified in this study.

Figure 3.3: An image of key interview takeaways and potential mitigation opportunities (photo credit: K.M. Kibler).

Reflections on Principle E and the Case Study

This case study demonstrates three important things:

1. All 12 principles in this book are represented to some degree in this one case study, which demonstrates their relevance.
2. When a community supports thoughtful, ethical, and locally relevant research, it is possible to develop context specific assessment tools, such as interviews.
3. Despite challenges, this community successfully supported a participatory research process. Social-political disagreements limited the scope and reach of this study, but this study's outcomes created an important and reflective foundation for future research and resilience efforts in the community.

Despite the obstacles identified, I left Bikotiba in 2018 hopeful for several reasons. While the traditional political divides in this community will take time to resolve, this participatory

research demonstrated to community members how those divides are hindering their progress over time. By supporting this research process, the community can move forward with new knowledge and local insight. This study integrated a variety of findings to develop a systemic body of information relevant to both participants and a broader scientific community. Participants and I left our study with an understanding that the community could better assess their specific climactic pressures as well as take action with minimal external assistance. I left Bikotiba confident that young leaders, like the RAs, were motivated and equipped with what they needed to guide their community in further climate change research and adaptation efforts.

Chapter IV – Household Agricultural Food Access in Bikotiba, Togo

Author's Note:

This chapter is presented as a standalone manuscript.

The views expressed in this manuscript do not represent the views of the United States Peace Corps.

Household Agricultural Food Access in Bikotiba, Togo

Abstract

West African farmers are among the most food insecure in the world and are threatened by climate change, environmental degradation, population growth, globalization, poverty, and political and economic instability. These threats hinder rural farmers' abilities to adapt to food system changes, or their resilience to food insecurity. If Indigenous communities, with centuries of traditional farming and ecological knowledge, seek and support research of their food systems, a researcher must foster ethical, decolonized knowledge exchange and prioritize community needs. In this study, my long-term relationships in Bikotiba (bih-CO-ti-buh), Togo, fostered a participatory study of household agricultural food access (AFA) and related community food security tipping-points. Semi-structured interviews with 56% of household heads in Bikotiba in 2018 led community Research Assistants and I to conclusions validated by the community. I conducted further data reduction techniques and statistical analyses, culminating in a group of eight related observed variables that could be combined to function as three lower dimensional representations of AFA. Further, I used partial least squares path modeling (PLS-PM) to explore relationships between the observed data and the unobservable AFA construct. PLS-PM indicated that the quantity of different crops farmed contributed less to AFA than choices, such as whether to keep livestock. Further, our study provided critical insight to challenges with the primary subsistence crop, maize, which will be critical as climate threats mount. These results pave the way for future participatory food system studies, including foci on maize monocultures, quantifying agricultural labor, farmer decision making, nutrition, and more.

Key Words: Climate Change, Globalization, Maize, PLS-PM, Resilience to Food Insecurity, West Africa

Introduction

Indigenous[1] West African societies like Bikotiba (bih-CO-ti-buh), Togo, with agricultural practices established for centuries, comprise a high proportion of the world's rural poor (Altieri et al., 2011; Nyoni, 1987; P. Sanchez, 2000). Rural smallholder[2] farmers like those in Bikotiba comprise 60% of the West African population and are among the most climate change[3] threatened and food insecure[4] globally (Bradshaw et al., 2009; IPCC, 2012; Matsa, 2021; Niang et al., 2014; Stork, 2010; W. Turner et al., 2010). Globalization[5], market pressures, corrupt agricultural policies, unavailable food (e.g., poor infrastructure), vulnerable grain storage, poor sanitation, decimation of intergenerational knowledge, climate change, and depleted agricultural soils challenge these farmers (Adda et al., 2002; Altieri, 2002; Altieri et al., 2011; Chambers, 2019; Ebert, 2014; Salinger et al., 2005; Thrupp, 2000; Worou et al., 2020). Climatic changes and habitat destruction for livelihood needs (e.g., coal production) threaten the resources available naturally for agriculture (e.g., trees to support a cooler climate). Therefore, food insecurity threats to the most vulnerable populations in West Africa continue mounting (Bradshaw et al., 2009; Chambers, 2019; Djabatey, 1993; IPCC, 2007; Niang et al., 2014; Stork, 2010; W. Turner et al., 2010). Despite these pressures, Indigenous populations demonstrate cultural pride, fortitude, and determination to meet their livelihood needs while living from and

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[1] *Indigenous* societies are relational, with historical local knowledge, wisdom, and experience of their environment, agriculture, culture, and traditions; they were colonized historically and often regarded as lower-income societies. Alternatively, *Western* societies are non-Indigenous, higher-income societies; they were the historical colonizers (Chilisa, 2012; P. Johnson, 2016; Lemke & Delormier, 2017; Michon et al., 2007; Rudnev, 2015; Wane, 2005).
[2] *Smallholder* farming here means rural cultivation of two hectares or less (George, 2014).
[3] *Climate change* is defined here as current and future threats to humans and biological systems from unpredictable and extreme changes to rain, temperature, soil nutrients, and agriculture that vulnerable populations need to survive, due to a warming planet and global environmental changes (IPCC, 2007; Mooney et al., 2009; E. Post, 2013).
[4] *Food insecurity* is referred to here as insufficient use of, access to, and availability of safe and nutritious food, as well as lack of supporting resources and policies (Bizikova et al., 2016; Boukary et al., 2016; Somda et al., 2017).
[5] *Globalization* is unequal global access to power and wealth, with consistent Western imposition of politics, economics, agriculture, and more onto Indigenous societies that the West deems less superior (Chilisa, 2012; Chimakonam et al., 2014).

respecting their relationships with the lands that sustain them (Appendix A) (Chilisa, 2012; L. Smith, 2012; Wane, 2005).

Needing to produce food for growing populations in West Africa has led to rampant nutrient depletion of farmlands and continued clearing of forests in search of fertile lands to produce subsistence[6] crops (Altieri et al., 2011; Antwi et al., 2018; Baudron & Giller, 2014; Ebert, 2014; Salinger et al., 2005). In Sub-Saharan Africa, climate change threatens agriculture with extreme weather events, shorter and unpredictable rainy seasons, erosion, soil depletion, biodiversity loss, altered ranges of pollinators, and crop failure (Björklund et al., 2012; Bradley et al., 2012; Chambers, 2019; Jones & Thornton, 2003; Knox et al., 2012; Oluoko-Odingo, 2011; Teixeira et al., 2013). Little question remains that many Indigenous African subsistence societies are vulnerable to climate change and food insecurity. What remains unknown is how they will cope and adapt. In response, resilience theory rose to prominence in food security research to aid communities in preparing for future food system perturbations (Alinovi et al., 2010; Boukary et al., 2016; Chamdimba et al., 2021; D'Errico et al., 2017; Munawar et al., 2021; Younginer et al., 2015).

Resilience to food insecurity, or food system resilience, developed from ecological resilience theory (Holling, 1973), which focuses on reducing vulnerability, or the risk of harm a system faces from a disturbance (Berkes, 2007b; Boukary et al., 2016; Munawar et al., 2021). Resilience theory posits that natural systems are inherently complex and uncertain (Cabell & Oelofse, 2012; Foran et al., 2014). Food systems are no exception to these complexities; both biophysical changes, particularly due to climate change, as well as social and economic changes (e.g., market pressures and failing infrastructure) affect farmers, leading to complex food system

[6] *Subsistence* farmers work primarily to cultivate the food they live from annually, with few inputs (Kremen & Miles, 2012; Murton et al., 2016).

dynamics that are highly vulnerable to shocks (Chamdimba et al., 2021; Milestad & Darnhofer, 2003; T. Smith et al., 2013; Zimmerer, 2014). Many food system inquiries have focused on household or community *vulnerability* to food insecurity, yet understanding *vulnerability* to food insecurity alone is insufficient to aid peoples in mitigating future food system changes (Béné et al., 2016). Therefore, research support for a resilience approach to food insecurity has grown (Béné et al., 2016; Boukary et al., 2016; Chamdimba et al., 2021; Munawar et al., 2021). A community must understand the strengths, weaknesses, and tipping-points within their food system[7] before they can plan sufficiently for a resilient future, meaning adaptation to unexpected social, economic, and ecological changes without whole system upheaval (Alinovi et al., 2010; Berkes, 2007b; Bizikova et al., 2016; Folke et al., 2010; Kremen, 2015; Tscharntke et al., 2012).

Using ecological resilience theory to assess specific food systems is a multidisciplinary, cross-cultural endeavor (Béné et al., 2016). If a community supports research (Gruber, 2020; Kibler, 2020) to understand their inherently complex and context specific food system, the invited researcher must foster decolonized knowledge exchange (Appendix A) (L. Smith, 2012) and participation, because local farmers are the only true experts on their food systems (Berkes, 2004; Bizikova et al., 2016; Cabell & Oelofse, 2012; Cullen-Unsworth et al., 2012; Foran et al., 2014; Kremen, 2015; Wane, 2005). The breadth of one study is likely insufficient, however, to study all the interrelated latent (i.e., unobservable) variables affecting food system resilience (Bizikova et al., 2016). Before attempting to understand the complex networks (Foran et al., 2014) of a whole food system, individual studies should assess one of the following components of resilient food systems: food use, access, or availability, and supporting resources, policies, or services (Bizikova et al., 2016). Researchers and communities together can study these food

[7] *Food systems* are the complex networks of biological, social, economic, climatic, and political factors that dictate a community's farming and food (in)security from planting to eating to discarding (Bizikova et al., 2016).

system components cumulatively over time to best understand food system resilience (Bizikova et al., 2016).

A successful example of a resilience approach to food security is Alinovi et al.'s (2008) conceptual model to quantify household resilience to food insecurity. Their theoretical framework led to a multi-stage approach for analyzing non-normal, mixed multivariate[8] data from household resilience to food insecurity interviews in Palestine (Alinovi et al., 2008). The authors assessed the following household components: social safety nets, access to public services, assets, income and food access, adaptability, stability, endogenous and exogenous shocks, household response mechanisms, and program policy support (Alinovi et al., 2008). They asserted that the Palestinian model was validated, suggested testing the analytical framework further, and called for inquiries into how similar models translate to food insecurity responses (Alinovi et al., 2008). I agree with the authors and heed their call to document over time whether and how findings from Indigenous food systems research are applied in those communities (Alinovi et al., 2008). Resilience to food insecurity research is valuable, but as Alinovi et al. (2008) asserted, without practical measures to implement findings, there is little value for stakeholders needing critical information to aid their future agricultural decision-making.

Like Alinovi et al. (2008), Bizikova et al. (2016) developed a conceptual framework of community food system resilience to climate change, based holistically on five complex and interrelated scales of food security: use, access, availability, supporting resources/services, and supporting organizations/policies. The authors assert that complex food system resilience assessments should begin at the lowest scales of food security (food use and access) and continue to higher scales; lower scales are studied most appropriately at the household and community

[8] *Multivariate* means more than two response variables (quantitative or qualitative) (Hutcheson, 1999).

levels (Bizikova et al., 2016). The authors tested their framework in Central America with participatory structured interviews and community activities (Bizikova et al., 2016). They found that higher scale policies and institutions (e.g., capacity building, transport and water systems, emergency management, land ownership, and health) influenced the communities' food use and access the most (Bizikova et al., 2016). The authors accepted the framework as valid to assess and enhance stakeholder comprehension of and ability to identify tipping-points in their complex food systems (Bizikova et al., 2016). They further recommended adapting this framework at local and regional levels and engaging regional stakeholders in local assessments (Bizikova et al., 2016).

Study Goals

Having lived and worked in the community of Bikotiba for two years as a US Peace Corps Extension Agent, my foundational knowledge of the community's culture, agriculture, and climate change threats, as well as my long-held relationships of trust, led me to reengage the community in 2017. I used a decolonizing (L. Smith, 2012) and feminist systems theory approach (A. Stephens et al., 2010) to hear their current challenges and shared my desire to continue working with the community as they deemed appropriate and as my skills allowed. The community shared their concerns of mounting climate, environmental, and social changes and I proposed this study to begin conceptualizing their food system. The goal of this study was to employ a feminist decolonizing approach to explore the following research questions with the community: 1) What factors contribute to household agricultural food access in Bikotiba, Togo? and 2) How does understanding household agricultural food access contribute to recognizing resilience to food insecurity leverage points in the community?

Study Design

Study Site

The Democratic Republic of Togo is a small West African country, with five regions (Figure 4.1) spread across 56,790 square kilometers and populated by more than eight million people in 2020 (World Bank, n.d.). In 2015, The World Bank in Togo (2020) classified 69% of rural Togolese households as living in poverty, which Kohnert (2021) affirmed. More than half of Togo's Gross Domestic Product is derived from the agriculture that at least 60% of Togolese rely on for subsistence (Bonfoh et al., 2016). Despite national economic reliance on farming, agricultural policies are weak and prioritize liberal modernization over care for the smallholder farmers that support the economy (Ali, 2017). Thus, vulnerable farmers are left unsupported and there are frequent disputes over farm ownership between state and Indigenous governments (Lal et al., 2015; Stiftung, 2016). Stiftung (2016) noted that smallholder farmers occupy securely just 36% of Togolese lands, and 25,000 hectares (ha) are threatened by purchase from corporations and the wealthy. I agree with Stiftung's (2016) assertion that poor governance, especially power control by the wealthy minority, deters Togo's socio-economic development. With agriculture as the foundation of Togo's economy (Bonfoh et al., 2016), it is unsurprising that severe deforestation (Folega et al., 2015) has boomed in Togo since the year 2000 (Herrmann et al., 2020) for farming and livelihood needs (e.g., wood for cooking) for an ever-growing population. Farming expanded cumulatively by 14,000 square kilometers (km) from 1975 to 2013, or 7% annually, and in 2018 more than 70% of Togo's land surfaces were cultivated (*The World Bank in Togo*, 2020).

Most of Togo is characterized by 900-1,500 mm of rainfall per year and a five to seven month dry season (Abate, van Huis, & Ampofo, 2000). However, climate change (Ofori-Sarpong

& Asante, 2004a) and deforestation are leading to spread of the Sahara Desert southward, which is likely to alter these norms (Wittig et al., 2007). The Sahara spread 100 kilometers south already from 1950 to 2015 and is predicted to expand another 6,000 km squared annually before 2050 (Liu & Xue, 2020). Such climate changes would expose more of Togo to decreased rainfall (500-900 mm annually) and a longer, eight month dry season (Abate et al., 2000). Similar to Sahelian countries further north (Yobom, 2020), Togolese farmers report to me, and I have witnessed since 2011, increasingly shorter and unpredictable rainy seasons, which are consistent with climate predications for the region (Ofori-Boateng & Insah, 2014) as demonstrated by Wittig et al. (2007) in neighboring Ghana and Burkina Faso, where results showed crop loses, financial burdens, and increased labor demands.

The rural village of Bikotiba is located in the Bassar prefecture (i.e., county) (Encyclopedia Britannica, n.d.) of the second northernmost region of Togo, Kara (Figure 4.1), where approximately 75% of the population lives in poverty (Noglo, 2017). Bikotiba is home to approximately 1,600 smallholder farmers (Kibler, 2020). Agriculture is the principal activity in Bassar and historically, as the population grew, Bassari parents had more children for future agricultural labor (N'Bohn, 2013); multiple participants told me that is still the case today. Maize is the staple subsistence crop, comprising two or three meals daily for most families, and millet, sorghum, cotton, yams, cassava, rice, cowpeas, and peanuts are also cultivated. *Pâte* is maize flour mixed with hot water to form a solid dipped in sauce comprised of oils and vegetables heated to a point at which I suspect that vital nutrients are mostly lost; while this could seem a judgmental statement on this Indigenous food system, nutrition is necessary to mention as a long-term trend in the context of resilience to food insecurity (Boukary et al., 2016; Lunga & Musarurwa, 2016). Local vegetable use in meals is primarily onions, tomatoes, chilis, okra, and

local leafy greens; raw vegetable consumption is rare. P*âte* does provide the condensed carbohydrates and energy needed for farming (McCann, 2001). Most Bikotiba farmers own livestock, but nearly none keep their animals from free grazing during the day, calling them home at night to eat (crop products available) and sleep. However, most families do not regularly eat the animals they keep, using them instead for ceremonies or to sell. Families commonly buy meat to eat weekly at the local market, though I am told overwhelmingly that the meat is reserved primarily for the male head of household, with remaining scraps sometimes given to the wife and children. Due to lack of refrigeration, rural farmers largely do not consume any milk products (children are sometimes given powdered milk), despite the prominence of goats; milk products are available at the local market but are cost prohibitive. Also available at the local market (in Bassar) but cost prohibitive for many are international products (e.g., cell phones, TVs), more expensive vegetables sometimes (bell peppers, carrots, cucumber, and cabbage) and other foods (imported legumes, maize, and other grains) available at market. These products arrive to Bassar weekly with the few vendors from the regional capital or on occasion with national truck drivers, which are often delayed due to accidents and breakdowns in route to Bassar.

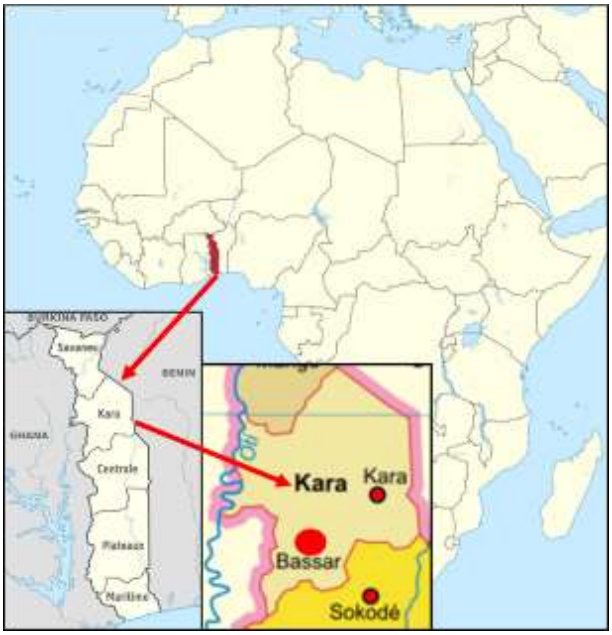

Figure 4.1. The location of Togo in Africa, the five regions of Togo, and detail of the Kara region, where this study took place in the Bassar prefecture. Created using Microsoft Publisher with creative commons license photos[9].

Data Collection

Throughout four months in 2017–2018, I used a feminist decolonizing approach to engage the community of Bikotiba to understand their food access challenges and conduct this study. The community nominated five Research Assistants (RAs) (Appendix E), with whom I collaborated to develop and implement a culturally relevant interview tool (Appendix B) (Kibler, 2020). Throughout March 2018, RAs and I refined and revised this interview on household agricultural food access in Bikotiba six times through pilot testing (Appendix E) before arriving at the final interview questions (Appendix B). Interviews covered household demographics (i.e., resident ages and genders), crops (e.g., hectares of each crop cultivated), stability of food access

[9] Figure 4.1. was created with three photos available through creative commons licenses available for modification and adaptation and accessed via Google Images and housed on Wikipedia Commons, with credit to the photos' creators: map of Togo in Africa is attributed to Wikipedia Commons by the creator, Martin H (2011), both the map of Togolese regions (2012) and the detailed region of Kara (2008) are attributed to Wikipedia Commons by their creator, TUBS.

(e.g., farm ownership or crop pests), and farmers' potential adaptivity to food access changes (e.g., family assets or response to crop failure). We also asked two open-ended questions: (a) What is climate change? and (b) What are your top five concerns about food and agriculture? The first question arose from participants citing climate change as a challenge and I wanted to know how they identified the phenomenon in their context. RAs and I facilitated three community meetings to share basic regional climate predictions and support the community discussing future priorities (Kibler, 2020). At the final meeting, the community validated conclusions RAs and I drew based on our experiences implementing this study.

Participant availability (Appendix E) limited interviews to 125 (56%) of the 223 homes in Bikotiba. Households were numbered randomly, no identifying information was collected, and RAs (whom I paid a moderate local wage) read a script to participants (Appendix C) requesting verbal consent to participate. RAs implemented the interviews, asking questions to heads of households[10] in the local language, Bassari, and writing the responses in French, while I observed the household context (e.g., water sources, food sanitation, and resources like gardens). Interviews lasted approximately 30–45 minutes and we conducted three to eight per day depending on participant availability. In most cases, the interviews took place at the participants' homes, though in some cases interviews occurred outside the home (e.g., under a nearby shade tree, outside at my residence, or outside in the village center).

[10] In this context, *heads of households* are the primary family decision makers. The elder male in most homes, with deference to the elder female in his absence. In this case, the head of household was always culturally clear to the RAs upon entering a home and asking for "Papa" or "Mama," with deference to the eldest child in their absence, if present.

Data Analysis

Following community validation of our conclusions, I modeled data statistically to better understand agricultural food access in Bikotiba. I will share conclusions with the community for further validation; ideally, I will deliver this manuscript personally in 2022.

To evaluate household agricultural food access, I conducted a multi-step, exploratory statistical analysis for complex multivariate interview data (Alinovi et al., 2008), which led to a partial least squares path model (PLS-PM) of household agricultural food access. I did not seek to confirm or explain the latent (i.e., unobservable) phenomenon of Agricultural Food Access (AFA), but rather to explore patterns and create a basis for future research. I used the XLSTAT Applied Sensory software (Addinsoft, 2021) for all analyses except outlier detection. I assessed outliers using RStudio (RStudio Team, 2020), including the mvoutlier (Filzmoser & Moritz, 2018) and robustbase (Maechler et al., 2021) packages. I coded raw qualitative data inductively (Linneberg & Korsgaard, 2019) to be locally, methodologically (Elliott, 2018; Lichtman, 2014; Maher et al., 2018; Saldaña, 2013), and statistically sound (Härdle & Simar, 2015; Henseler & Fassott, 2010). The Shapiro-Wilk, Anderson-Darling, Lilliefors, and Jarque-Bera tests of normality showed that all variables were significantly non-normal ($\alpha = 0.05$) (Appendix H). Nonconforming interviews (i.e., does not practice agriculture), those with participant distractions, and those with missing values were excluded. Therefore, of the 125 interviews conducted, only 110 were analyzed for outliers, to which subsequent analyses are sensitive (Schamberger et al., 2020; Vinzi, Trinchera, et al., 2010). I used the fast minimum covariance determinant algorithm developed by Rousseeuw & Driessen (1999) to test for multivariate quantitative outliers. Ultimately, I excluded 10 interviews based on improvements to chi square distributions as outliers were removed, while maintaining sufficient exploratory data variability

(n=100) (Appendix I). I also looked for outliers in observation maps (Appendix I) (Chavent et al., 2014; Härdle & Simar, 2015), though no households were errant enough to exclude without more evidence.

Partial least squares path modeling (Wold 1982; 1985) was appropriate to explore the reduced dataset of eight observed variables (Figure 4.2). I conducted a formative PLS-PM using XLSTAT (Addinsoft, 2021) to assess model fit based on the composite reliability, critical eigenvalue and eigenvectors, variable-factor correlations, path weights, standard errors, bootstrap weights, communalities, and blindfolding communalities (Appendix J) (Addinsoft, 2021; Garson, 2016; G. Sanchez, 2013; Vinzi, Trinchera, et al., 2010). Data, or dimension, reduction techniques like principal component and multiple correspondence analyses are useful to explore non-normal data preceding PLS-PM, which is itself a dimension reduction method (Bry et al., 2016; Henseler, 2018; Zhou et al., 2016). Reductions commonly precede structural equation modeling (SEM) for multivariate resilience to food insecurity data (Alinovi et al., 2008). PLS-PM is a viable alternative to SEM for non-normal, small sample sizes (Benitez et al., 2020; Chin, 1998; McIntosh et al., 2014; Samani, 2016; M. Tenenhaus, 2010). Following more than 100 exploratory data reductions (Appendix K) investigating logical and theoretical combinations of observed variables, three final mixed principal component analyses (Appendix K) (Chavent et al., 2014) led me to accept a group of eight correlated variables (12 dimensions[11]) theorized to form part of household AFA. Those three underlying factors could together explain 65% of the dataset's variation. The eight variables forming the conceptual path model of AFA (Figure 4.2) to be assessed with PLS-PM were whether farmers keep livestock, distance to farm, sleeping at farm, whether farmer grows vegetables, hectares of maize, hectares of tubers (cassava and yam),

[11] There are more dimensions than observed variables due to four of the questions being binary categorical variables, each representing two dimensions of responses.

hectares of other grains (millet and sorghum), and whether the farmer employs live-in farm workers (Figure 4.2).

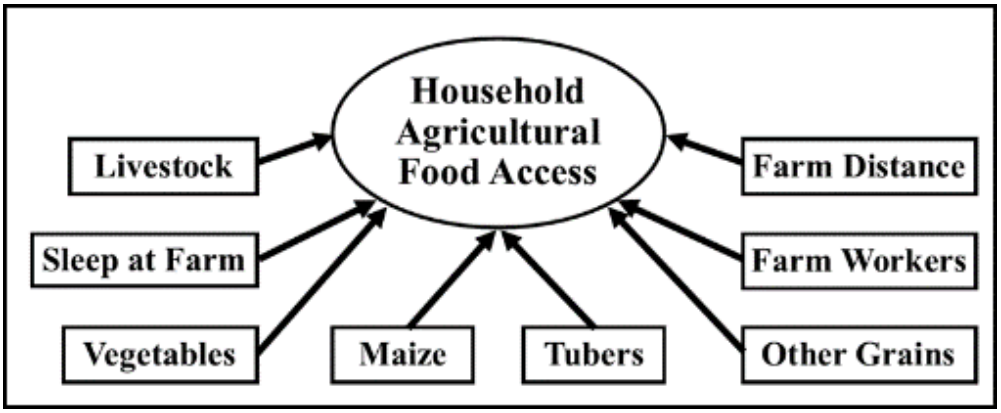

Figure 4.2. Conceptual path model of agricultural food access (AFA) in Bikotiba, Togo. The unobservable construct, AFA, is represented by the oval, with the observed variables that are theorized to manifest (i.e., arrow toward oval) it represented in rectangles (Alinovi et al., 2008). Maize, tubers, and other grains as numerical hectares and the remaining variables as binary yes/no.

Results

The data provide critical understanding of the context in Bikotiba. I observed a population of 717 residents in the 100 participating Bikotiba households. The mean number of household residents is 7.17 (ranging from 6.53—7.81, with standard error of the mean at 0.32), compared with up to 25 maximum residents in outlier households, for example. Extrapolating mean residents for the 223 households in Bikotiba could indicate an approximate total population of 1,600. Household demographics show that most residents are less than 10 years old (207) or 18–50 years old (275). The average age of respondents is 47 years; 40 respondents are women, 60 are men, and 14 respondents are unmarried. Fifty percent of households have a resident with a job contributing to their family income: tailor, welder, pump mechanic, chauffer, baker, *fetisher* (traditional healer), carpenter, gardener, hair stylist, food transformer, mason, teacher, wood exporter, stamp maker, electrician, or beekeeper. In 73% of participating households, the male head of household controls the family money, followed by 21% of female heads, and in 6% of cases they share

financial control. Families travel a maximum 32 kilometers to their farms, with a mean 8.53 kilometers. On average, families report growing 1.33 ha of tubers, 1.08 ha of maize, 0.96 ha of other grains, and 0.48 ha of legumes (cowpeas and soybeans). Most Bikotiba farmers also grow fruits (60%) and vegetables (73%) (Appendix L). In Bikotiba, families grow predominantly okra (63%), cashews (55%), and the leafy green *ademe* (I believe to be *Corchorus olitorius* L.).

Most participants own their farms (88%) (Appendix L), with the remaining 12% of families borrowing and cultivating part of someone else's land. Few households report employing a live-in farm worker (13%) (Appendix L). Few participants have savings in case of emergency (15%) (Appendix L), with the overwhelming reason being poverty. Most families keep livestock (86%) (Appendix L) that can be sold for a profit: goats, pigs, rabbit, pigeons, bees, chickens, turkeys, and/or cows. Approximately half (52%) of participants report that at least one family member sleeps regularly at their farms (Appendix L) an average 11 nights monthly, and approximately 18% of those homes report sleeping at the farm more than 20 nights monthly. Sleeping at the farm is necessary due to farm distance, tending animals, and/or to protect from crops pests; 92% of participants report crop pests (Appendix L) including monkeys/apes, partridges, pigeons, other birds, mice, squirrels, bush rats, hares, foxes, elephants, caterpillars, termites, and crickets. At least 16 participants also assert that the semi-nomadic Fulani tribes steal from their farms and destroy crops (Fulani are cattle herders, and their livestock eat cassava leaves and millet), leading most participants to categorize the Fulani as "pests".

Farming practices have changed throughout recent generations due to internal and external influences. Most participants (94%) farm differently than their parents' generations (Appendix L) because their parents did not need fertilizer to grow maize, did not use chemicals

(e.g., insecticide or herbicide), grew food to eat only and not sell, had more rain, cultivated smaller parcels, had rich soils, sharecropped with neighbors, grew less maize (if any) in favor of millet and sorghum, and did not grow rice. Most participants (77%) have changed the way they farm during their own lifetimes (Appendix L) due to need for chemicals, heavy maize and soy production, finances, need for farm workers, growing families, health, and availability of farm machines. Heads of households overwhelmingly (96%) report that they plan their food for the year based on harvests and family needs, which they summarize as the local term, *programme*. This means families keep the minimum amount of maize harvest needed to feed the family for the year and sell remaining harvest when emergencies arise, or the family needs/wants money.

Fertilizer is required for maize production and price fluctuations are unpredictable. Nearly half (48%) of participants say they suffer during crop failure or when fertilizer prices change, while others attempt to borrow (14%) or buy (16%) food or fertilizer before suffering (Appendix L). Participants report that approximately eight kilograms (or one sack) of fertilizer costs at minimum an average 11,000cfa ($20 USD[12]) and at maximum an average 14,500cfa ($27 USD). At the time of interviews in 2018, six sacks (50kg) would fertilize approximately one hectare of maize, which at a mid-to-high range price of approximately 13,500cfa ($25 USD) per sack, would cost a farmer 81,000cfa ($150 USD). A good harvest of that hectare would yield approximately 1,300 kilograms of maize, which could sell for a good price of approximately 16,000cfa ($30 USD) per 100 kilograms. Participants report that a subsistence family of two adults and two small children would consume at minimum 200 kilograms of maize annually. If a farmer kept 200 kilograms of a good harvest for subsistence and sold the remaining 1,100 kilograms, they could earn approximately 143,000cfa ($264 USD), for a net profit of 62,000cfa

[12] Financial results are presented in local Togolese currency, the French CFA (cfa), and US dollars using the conversion rate the day that interviews began (March 30, 2018) of approximately 541.60cfa = $1 (*Currency Converter - Foreign Exchange Rates Calculator | Xe*, n.d.).

($114 USD). In a dire year, with the same fertilizer cost, followed by meager harvest of 700 kilograms of maize, that same family could only sell 500 kilograms, and would *not* profit at a low selling price (14,000cfa or $26 USD per 100 kg). Instead, the family would lose approximately 11,000cfa ($20) net on the year.

Most participants define climate change as, “The adverse consequences of scarce rain.” Some cite humans as the cause. Others cite violent rain and wind events, poor environmental stewardship, bush fires, temperature changes, the wood market, and deforestation or what several participants called, “The slaughter of trees.” One participant said, “We changed nature. In my opinion, the stone and the tree do not move. Therefore, the change is from us.” The participants’ cumulative five greatest food and agriculture concerns are scarce/unpredictable rain, physical health, depleted soils, disagreements (land/social), and insufficient/expensive/low quality fertilizer.

The partial least squares path model’s composite reliability results for the AFA model (Figure 4.2) show three critical (above 1.50) eigenvectors of 4.05, 2.41, and 1.84 (Table 4.1.A). Within the three critical factors of AFA, F1 is correlated most with sleeping at the farm (± 0.74) and livestock (±0.67) (Table 4.1.A). F2 is correlated highly with vegetables (±0.63), maize (0.56), and farm workers (±0.64), though all three are also correlated with F1 at ±0.57, -0.49, and ±0.50, respectively (Table 4.1.A). F3 is correlated most with farm distance (0.63), which is related to a lower degree with F1 at -0.54 (Table 4.1.A). Tubers (0.68) and other grains (0.69) are correlated more with F4 than any other factors (Table 4.1.A). Additionally, while correlated with F2 within the critical factors (Table 4.1.A), maize is correlated most with F6 at 0.61.

Path weights show that AFA is influenced most by not growing vegetables (-0.29), having farm workers (0.25), keeping livestock (0.33), and sleeping at the farm (0.37) (Table

4.1.B). AFA is influenced minimally by maize (0.12), tubers (0.11), other grains (0.09), and farm distance (0.13), with no influence from the remaining dimensions coded 1/yes (Table 4.1.B). Bootstrap weights are negligibly different (Table 4.1.B) and standard errors for path weights are low, with none higher than 2% (Table 4.1.B).

AFA shares moderate communalities with sleeping at the farm (0.55), livestock (0.45), and vegetables (0.33) (Table 4.1.C). AFA shares minor communalities with maize (0.24), tubers (0.21), farm distance (0.29), and farm workers (0.25) (Table 4.1.C). The mean communality of AFA is 0.34, with standard error range from 0.04 to 0.09 and a mean error of 0.06. The blindfolding assessment shows a mean communality of -0.084, with the highest blindfolding communalities for maize (-0.22), other grains (-0.36), farm distance (-0.31), not having farm workers (0.22), not growing vegetables (-0.18), sleeping at the farm (-0.18), and keeping livestock (-0.16) (standard errors are not reported for blindfolding) (Table 4.1.C).

Table 4.1. Partial least squares path model results for analysis of household agricultural food access in Bikotiba, Togo.

A. Composite Reliability: F1–F3 were critical factors, with eigenvectors greater than the critical eigenvalue (1.500). Square cosines of variables show highest correlations with AFA.

B. Path Weights: Model path weights from the observed variables to AFA, including robust bootstrap weights, and standard errors.

C. Communalities: The common variance between the variables and AFA, including blindfolding as additional validation.

PLS-PM of Household Agricultural Food Access Results										
A. Composite Reliability						B. Path Weights			C. Communialities	
Eigenvalue	4.045	2.411	1.835	1.344	0.963					
Observed Variable	**F1**	**F2**	**F3**	F4	F5	**Weight**	**Bootstrap Weight**	**Standard Error (%)**	**Communality**	**Blindfolding Communality**
Maize (ha)	-0.493	0.564	-0.140	-0.032	-0.058	0.122	0.121	0.006	0.243	-0.219
Tubers (ha)	-0.459	0.158	-0.104	0.682	-0.164	0.113	0.112	0.005	0.211	-0.093
Other Grains (ha)	-0.381	0.057	0.050	0.693	-0.412	0.094	0.093	0.004	0.145	-0.358
Farm Distance (km)	-0.536	-0.001	0.632	-0.111	0.135	0.133	0.131	0.006	0.287	-0.313
Vegetables (No)	0.576	0.628	0.230	-0.202	-0.413	-0.285	-0.282	0.013	0.331	-0.181
Vegetables (Yes)	-0.576	-0.628	-0.230	0.202	0.413	0.000	0.000	0.000	0.331	0.062
Livestock (No)	0.670	0.435	0.249	0.360	0.410	0.245	0.243	0.011	0.448	0.119
Livestock (Yes)	-0.670	-0.435	-0.249	-0.360	-0.410	0.000	0.000	0.000	0.448	-0.159
Farm Workers (No)	0.496	-0.639	0.504	0.119	-0.172	0.331	0.328	0.015	0.246	0.219
Farm Workers (Yes)	-0.496	0.639	-0.504	-0.119	0.172	0.000	0.000	0.000	0.246	0.030
Sleep at Farm (No)	0.744	-0.201	-0.577	0.090	-0.061	0.368	0.364	0.017	0.554	0.069
Sleep at Farm (Yes)	-0.744	0.201	0.577	-0.090	0.061	0.000	0.000	0.000	0.554	-0.188

Discussion

The story of agricultural food access that arose during this study is predominantly about maize subsistence in Bikotiba. Farmers in Bikotiba wake early (i.e., 3:00 AM–4:00 AM) to arrive at their farms up to 32 kilometers from their homes, most commonly on foot, by bike, and on motorcycles for some. Working their fields in the blistering West African sun, these farmers demonstrate tremendous courage daily as they adapt to changing weather and natural resources, and government and social instability (Kohnert, 2021). It is dire for a farmer knowing that suddenly more unpredictable weather could alter their maize crops (Wittig et al., 2007), meaning they could not maintain their livelihoods and feed their family later in the year.

Maize is one of the most historically globalized crops in Africa (Bjornlund et al., 2020; Cherniwchan & Moreno-Cruz, 2019; McCann, 2001). Participants in Togo report that once earlier generations witnessed the financial advantages, maize was accepted widely as a new possibility, which Cherniwchan's and Moreno-Cruz's (2019) description of maize in precolonial Africa corroborates. Participants told us that modern farmers then transitioned drastically from their parents' or grandparents' subsistence crop traditions of cassava, yams, millet, and sorghum. Further, globalized introduction of a floury maize variety (McCann, 2001) led to today's staple meal two or three times daily for adults and children in rural Togo, *pâte*. Participants stated that they are uninterested in switching back to eating predominantly traditional, more drought and climate resilient crops that do not require fertilizer, like sorghum (Cherniwchan & Moreno-Cruz, 2019; Sultan & Gaetani, 2016), because they no longer like the taste. Collaborators told me the situation is worse because families with low maize yields are more commonly running out of food and thus eating maize less than four months after harvest, when participants say that chemicals like fertilizer are still dangerously present on the grains. This seasonal hunger due to

maize yield gaps (Tesfaye et al., 2015) is common and predicted to continue to 2050 throughout West Africa (Defrance et al., 2020; van Ittersum et al., 2016) and sub-Saharan Africa, where maize remains the primary subsistence crop (Leitner et al., 2020).

Reliance on maize in Bikotiba threatens long-term food access. Without action, vulnerable maize yields are expected to decline due to higher temperatures that shorten crop cycles, with lesser but significant impacts from rain variability too (Sultan & Gaetani, 2016). Without adaptation measures, intense maize production in countries like Togo will reduce yields beyond 2030 (Sultan & Gaetani, 2016). For example, farmers in Togo are attempting to adapt and modify each season based on rainfall changes to mitigate losses (Sultan & Gaetani, 2016). Jones' and Thornton's (2003) climate models of Africa and Latin America showed that by 2055, up to 75% of countries could yield as little as 200 kilograms per hectare of maize, compared to a meager harvest in Bikotiba right now of 700 kilograms with fertilizer use. In Togo specifically, maize yields are predicted to be approximately 200 kilograms less in 2055 (889 kg) than they were in 2000 (1,097 kg) (Jones & Thornton, 2003). Predictions for maize in West Africa are variable, with average cereal (i.e., maize) yield decreases of 18% predicted in southern countries of West Africa, like Togo, by 2050 (Ahmed et al., 2015). Indigenous communities like Bikotiba are the primary stakeholders of these predictions, which should be shared with them in decolonized, locally, and culturally relevant ways, as we did in this study.

The partial least square path modeling results add to this story of food access. Sign directions of path weights indicate that not growing vegetables could reduce food access, logically. It would be interesting to know the temporal stability of vegetable access and use over time as a factor in the community's long-term nutrition. This statistic is concerning for the 27% of families who do not grow vegetables; I question how these families supplement their food

access beyond traditional crops. Further, having live-in farm workers, keeping livestock, and sleeping at the farm all could enhance AFA. Communalities indicate low effects on AFA from all crops, farm distance, whether the family grows vegetables, and whether the family employs farm workers. Whether the family has livestock and whether they sleep at the farm had moderate communalities and therefore higher potential effects on AFA (Garson, 2016). While standard communalities indicate such moderate effects, the blindfolding results, particularly a negative mean blindfolding communality, indicate that those values should not be used to assess the model quality (Vinzi & Russolillo, 2013). Results with lower communalities and path weights could be considered for exclusion in future models.

The model path weights and standard communalities suggest that the actual area of crops a farmer in Bikotiba cultivates could be less relevant to AFA than the choices farmers make, such as whether to keep livestock and whether someone should be sleeping often at the farm. Future stability studies would prove valuable to understanding whether these farming choices enhance or detract from the household's food security. For example, does needing someone to sleep regularly at the farm hinder a family's overall household resilience to food insecurity? As one participant stated, "Women often do not see that their husbands are poor because the husbands live at the farms." While not true for all families, the social dynamics resulting from farmers needing or choosing to sleep at their farms primarily, away from their households, requires further attention. Participants said they sleep at farms to protect against crop pests, save time commuting, and manage livestock.

I am unsurprised that the choice to *not* keep livestock could be a detriment to a household's food access. In Bikotiba, the goal of keeping livestock seems mostly to sell for income or to kill during a traditional ceremony, rather than for the family to eat. Livestock

running loose in the streets is a common sight in Togo. Unfortunately, free grazing leads to frequent social disagreements in Bikotiba when one's animals harm another's home or crops. For example, the Bikotiba women's gardening cooperative was unable to supplement their food access for years due to roaming animals destroying their gardens. If not using livestock for food, containing livestock provides opportunities for collaborative natural fertilizer generation (Powell et al., 2004). For example, approximately 10 years ago, farmers in Bikotiba formed a rabbit cooperative and constructed a large, multi-room building to contain and raise rabbits. The cooperative members would process rabbit excrement for fertilizer and sell rabbits for income. However, the rabbit cooperative dismantled over time for social reasons that were unclear to me and deserve further attention; I anticipate that the group's foundation could have been unstable, with the effort initiated by a former American volunteer who perhaps did not consider the Indigenous community's long-term needs fully. I assume livestock could enhance a family's adaptivity because animals could be sold for income during seasonal hunger. Conversely, participants told me that families often sell animals to a financial detriment when the income is not spent on matters of food security but instead on celebrations, holidays, and traditional ceremonies (e.g., funerals). The complexities of keeping livestock in Bikotiba are clear and demand further attention.

In conclusion, these cumulative findings provide a critical foundation for deeper assessments of household resilience to food insecurity in Bikotiba, Togo. The long-term relationships of trust I am privileged to have in Bikotiba (Kibler, 2020) by practicing feminist decolonizing research made this study possible and inform my recommendations. I urge that research with other Indigenous communities in Togo and beyond be based on similar relationships. Participants and I shared knowledge together and generated new knowledge

through household interviews and community meetings, where participants heard our conclusions and affirmed our interpretations (Chilisa, 2014; Kibler, 2020). Future food system studies over time (Bizikova et al., 2016) would allow greater resilience to food insecurity understanding in Bikotiba. I recommend future feminist decolonizing food system studies with a greater percentage of homes to reduce limitations of sample size in future modeling. I also urge studies of soil quality related to maize and fertilizer use, livestock management, time and labor devoted to maize, crop rotation, deforestation due to wood export versus livelihood needs, grain storage, nutrition, and potential resolutions to village disputes by focusing on the community's whole resilience to food insecurity, among others. I recommend regional and national assessments of food availability and supporting resources in Togo from environmental, social, and political perspectives (Bizikova et al., 2016). Understanding mechanisms keeping rural, subsistence farmers like those in Bikotiba vulnerable to food insecurity will help enhance their resilience over time. The history of maize use in Togo merits further study, both capitalistically and as it has been incorporated into traditions. Participants told me Togolese families continue mass maize cultivation for sales to a larger market so they can appear wealthy (Yeros, 2002). This leads to an ultimate comment on globalization as a key determinant of food access and availability globally that cannot be ignored (Hendrickson, 2015). With greed and wealth being President Gnassingbé's goal throughout his family's domination of Togo since 1967 (Kohnert, 2021; Piot, 2010), it is unsurprising that wealth and accumulation of things to depict status (Yeros, 2002) have been demonstrated from the top-down for decades. Globalized agriculture in Togo deserves focus at the regional and national levels to explore what keeps the top-down culture of capitalistic agriculture in place over a culture of bottom-up, sustainable, farmer-focused cultivation that is merited throughout the literature (Agula et al., 2018; Anyonge

et al., 2001; Franzel et al., 2004; Michon et al., 2007; Nabhan et al., 1999; Oborn, 2017; Sandhu, 2021; Sodhi et al., 2010).

Chapter V – Storying the Research

Author's Note:

The opinions expressed in this chapter do not represent the views of the United States Peace Corps.

Storying the Research

At its most basic, this dissertation is a love (Appendix A) letter to the people of Bikotiba, Togo, whose stories I will share here with radical empathy (Nencel, 2014) to enliven the context of agricultural food access in the community. The preceding chapters in this dissertation made it clear that the powerful forces of climate change are amplifying food insecurity of Indigenous communities (Bizikova et al., 2014, 2016; Duruigbo et al., 2012; IPCC, 2012; Islam & Zhang, 2018; Kumasi et al., 2019; Lukhele-Olorunju et al., 2021), and that neocolonization (Kim, 2010) continues oppressing subsistence farmers (Lemke & Delormier, 2017) under the guise of development for all in Africa (A. Abdi, 2010; Wane, 2005). The knowledge generated in the three preceding chapters is for naught without sharing stories of those living the realities of agricultural food access in Bikotiba. These stories deserve to be told to the world (Kinloch & San Pedro, 2014), especially parts of the world from which globalizations and climate changes sprang (Malone, 2002), so that those in the Global North (Pashby & Sund, 2020) glimpse the consequences for those impacted most. Storying (Appendix A) (Kinloch & San Pedro, 2014) itself is a decolonizing principle of Indigenous peoples claiming power over their oral traditions (L. Smith, 2012) and is a critical aspect of many relational Indigenous cultures (Chilisa, 2012; Chuwa, 2014; Iseke, 2013).

In this chapter, I share stories of the research and farmers' lived experiences in Bikotiba as authentically as possible through my eyes based on oral histories (Appendix A) told to me during my time there. While I learned these stories through a globalized language, French, most stories were told originally in Bassari and translated to French by a Bikotiba community member; I acknowledge that these stories are incomplete because they are told in English and through my interpretation of knowledge shared with me. I will share these stories with the community for their validation (Pine, 2008; Snow et al., 2016) in 2022; ideally I will deliver this

dissertation to the community in-person. I do not seek to perpetuate scientific colonialism (Ciofalo, 2019) and presume to validate the community's Indigenous knowledge (Massey & Kirk, 2015)—the value of their knowledge is inherent (Wane, 2005). Rather, I seek the community's discourse to validate *my understandings* of our research together, and to ensure I have not exerted my power and misrepresented (Appendix A) them. This is another application of my reflexivity (Massey & Kirk, 2015; Nagar, 2015; Nencel, 2014; Riach, 2009), an expression of decolonial love (Appendix A) (L. Smith, 2012) to understand the implications and opportunities from this research. I reflect on specific participants as examples of life as subsistence men, women, and children in the Bikotiba context to further illuminate their food access, discuss challenges and top-down injustices that complicate their food access, and discuss opportunities that arose for reclaiming their Indigenous food system from the community supporting this research.

Life in Bikotiba

One of my longest and most cherished relationships is with Ismael (self-chosen pseudonym), a typical subsistence (Baiphethi & Jacobs, 2009; Murton et al., 2016) farmer in Bikotiba, who cultivates small parcels of staple crops to feed his family for the year. Ismael is approximately 40 years old and has four living children. He was my designated community counterpart during the Peace Corps, and we grew to be close friends as he guided me through the culture, taught me, and defended me from harassment, having steered the previous volunteer through the same process. Every day he works his fields, assists as a water pump mechanic, or works his masonry trade. Ismael was my neighbor, and each evening for two years I would hear a knock on my window and, "*Tanti, comment?*" meaning, "my aunt, how are you?" Referring to a woman as your aunt or mother is a sign of respect in Bikotiba, whether related by blood. If it

were too late in the evening to greet me when Ismael arrived home, I could be sure I would hear the same knock before he left for his fields the next morning. Ismael continued as a trusted advisor throughout this research and was a tremendous leader to the Research Assistants and community. Through the death of a child, his wife leaving him alone to care for his three children and nephew, farming, familial, and social challenges, and more, Ismael remains a strong, resilient, progressive Togolese man who breaks his body daily to care for his family and community. Still, he also cares for me. Many days he would hurry home from the farm or go to work late in the sun of the day because he made time to help with this research. Ismael would miss time in his fields to drive his ailing motorcycle to Bassar to gather food and water for community meeting participants because he believed in the research goals. I truly question how Western researchers can walk into Indigenous communities like Bikotiba without comparable prior relationships and expect to act ethically without decolonization (L. Smith, 2012), radical vulnerability (Nagar, 2015), and radical empathy (Nencel, 2014) founding such relationships, as I discuss in Chapter II. Ismael has inspired me for more than a decade and for that, I am grateful.

Farmers like Ismael demonstrate tremendous courage as they adapt to changing weather (Jones & Thornton, 2003), natural resources (Bizikova et al., 2014), and government and social instability (Kohnert, 2021), while trying to maintain their livelihoods (Baiphethi & Jacobs, 2009; Murton et al., 2016). It is dire for a farmer knowing that suddenly more unpredictable weather could mean they cannot feed their family later in the year. The difference between meager and successful annual maize harvests is currently 700–1,300 kilograms, respectively. I compel anyone reading to practice radical empathy (Nencel, 2014). Try imagining not knowing whether you would be able to feed your family because one day an unpredictably violent windstorm topples the corn harvest before it produces, and you suddenly have almost 50% less food to make

it through the year; I witnessed this happen to Ismael. Imagine also that no one in your home has a job to supplement your food access when harvests fail and there are four or more children to feed, as I have also witnessed. I imagine it being both motivating and defeating, and I walk around Bikotiba in awe of the mental fortitude that keeps farmers going. When I was in Bikotiba last in 2018, Ismael was suffering from seasonal hunger, running out of maize for the family months early, and forcing him to spend almost as much money as he would profit from a successful harvest (approximately 60,000cfa) to feed his family before the next harvest, as I discussed in Chapter IV.

Women generally contribute to their families and communities differently than Togolese men due to disparities in domestic responsibilities. In rural Togolese communities, women are typically responsible for the cooking, cleaning, and childcare before agricultural responsibilities; however, once the home is tended you can be sure the female head of household and her children will be tending the farm also. The woman who housed and essentially "raised" me in Bikotiba, Awusi (pseudonym), the woman who cared for me during this research, Aleewa (pseudonym), the women Research Assistants, Angel and Clementine (self-chosen pseudonyms), and countless others taught me about women's lives in Bikotiba. Awusi has a compelling story. Unlike most Togolese homes, there was no male head of household present in this family for decades, including when I lived with Awusi. All Togolese women are strong, but Awusi's mothering role to me means that true nepotism makes her one of the strongest I know. Familial instability left her for decades as the single parent raising four powerful and successful Togolese women, a kind, respectful, and smart Togolese man, and still raising three grandchildren. All the while, she maintains a farm, a home, a community garden, and a brilliant sense of humor and smile. She maintains this lifestyle well into her 50s and now cares for her returned, aging husband too.

Awusi has walked around the Bassar prefecture for decades, purchasing and selling smoked fish, farming, and gardening to feed her family. Today, her knees and eyes pain and challenge her and still, she walks the two kilometers to and from her fields carrying wood on her head for the cookstove, plants and harvests her one hectare of land, sweeps the home, and pulls water from the well to carry home on her head or uses it to nourish her meticulous garden plots. Awusi is an example of how many wives and mothers in Bikotiba spend their days.

Awusi is the president of the Bikotiba women's garden cooperative. The women were donated a plot of land near to the village center well over a decade ago. Here, more than five women maintain plots of mostly local leafy greens, with a well on the property. This water source is essential to the women gardening year-round through the dry season to supplement their food access and income; this is the source of income many of the women rely on for hospital bills and school fees. Another community garden opened recently in the next town, where a German-funded middle school was constructed, which are few in rural Togo. During my first two years in Bikotiba, I witnessed Awusi's garden plots become virtually unusable because the fence had burned down in a bush fire, leaving the land open to livestock uncontained by their owners as is common in West Africa (Powell et al., 2004); Hough (1993) discusses the impetus for farmers using fire in West Africa, such as traditions and crop pest control, and Tschakert and Shaffer (2014) cite uncontrolled bush fires as barriers to climate change adaptation in neighboring Ghana. As I discussed in Chapter IV, the use of and care for livestock deserves greater attention in Bikotiba and throughout Togo regarding food security (Sivakumar et al., 2005; Tittonell & Giller, 2013). For example, if families or cooperatives begin containing livestock from grazing to generate fertilizer, would they have to diminish their already suffering corn stocks to feed them? The women gardeners had no choice but to fence the garden and in

2013, I helped them to apply for a US Agency for International Development (AID)-Feed the Future (FTF, n.d.) small grant to replace their fence; the women worked to contribute 25% of the project costs. The fence stands almost 10 years later, and the women continue gardening to support their food access (Fonjong & Gyapong, 2021).

Young women with children in Bikotiba, like Research Assistants Angel and Clementine, have different day-to-day experiences than elder women like Awusi. In this context, the topic of youth marriage (Kohnert, 2021) arose consistently in my interactions, particularly with the Research Assistants in preparation for community meetings and during a meeting with young men students. The students told me that Bikotiba children are insufficiently supported by their parents, who do not provide the education or financial support to discourage youth marriages and limit frequent births. The students said that youths should not be marrying until at least 18, while it is commonplace in Bikotiba for girls especially to be married by 13 years old. One young man said that "kids are having kids," and some young girls require dangerous and expensive surgeries to give birth. The students were adamant that parents in general do not support their children sufficiently to avoid these marriages. They said parents do not counsel their children on these issues because they do not have the "words or time". I wondered if perhaps their parents lacked the information needed to counsel their children on reproductive options and sexual health. In the absence of parental support on these matters, we discussed how the youths could counsel each other and set good examples for their peers regarding sexual health. We also discussed how older siblings could take a role in educating and advocating for their younger siblings. The young men said there were not enough condoms available, and I wondered if this was more a matter of stigma. They said their parents did not talk about condoms, but I knew that condoms were readily available from local merchants. Young men could likely feel too embarrassed to purchase

condoms for fear that others would find out. Research Assistants agreed with the students, adding that cultural stigmas make parents uncomfortable teaching their children about birth control measures and some cultures reject such measures. In Togo, "The prevalence of childhood marriage (before age 15) [has] declined, ranging from 11.1% among women aged 45–49 to 1.9% among those aged 15–19" (Kohnert, 2021, p. 16). I insist that these are only the reported rates, while the real rates could be much higher despite what seems like a promising decline. I was told that two further challenges then arise from child marriages: frequent pregnancies and marital conflicts.

Overpopulation is a clear global concern (Magomedov et al., 2021; Pagett, 2018) and culturally sensitive reproductive education and resources are unavailable to communities like Bikotiba (Melesse et al., 2020). I can attest to the sexual health taboo. For example, near the end of my first two years in Bikotiba, I had grown close with a group of women and offered for my neighboring fellow Peace Corps health volunteer to discuss with them privately the modern family planning options available locally. I would not have initiated such a sensitive engagement without long-held relationships of trust with these women. Late one evening, the women gathered in private, and we demonstrated and discussed their reproductive health options, including those their husbands could be none the wiser to. Many Togolese husbands refuse to allow their wives to use birth control, seeing more children as a matter of pride. I was familiar with some women using birth control in hiding from their husbands to protect their families' wellbeing, knowing that they could not successfully care for more children. Some of these elder women even felt it was taboo to discuss this with their female friends. In addition to citing their husbands being farmers as a reason, women said that frequent births harmed their bodies and prevented them from having jobs to support the family. This example underscores the

complexities of womanhood and parenthood in Bikotiba. I can also attest to marital disputes that participants cited as a concern and that are frequent in Bikotiba, which often arise from the family being so large. I am told these disputes are one reason men choose to sleep at their farms, leaving their wives with the domestic and childcare responsibilities.

Given that Baby Saye inspires my work as discussed in Chapter I, it follows that children's lives in Bikotiba and the challenges facing them are also worthy of discussion. Young girls and boys in Bikotiba begin carrying water and other items on their heads young so that their necks become strong to do so for life; I have seen farmers carry up to 100 kilograms of maize on their heads. Little girls also begin learning domestic responsibilities young, sweeping their doorsteps with tiny brooms. It is common to see an adult giving their child as young as two years old local beer daily or even moonshine during celebrations. Small children are often given a daily "allowance" of 100cfa ($0.20 USD) or less, for example, which could buy them breakfast and a snack later from a local saleswoman. Prior to primary school age, children roam the village playing most of the day or follow their parents to the farms. It is common to hear a mother or father yelling from the family compound for their child to come home. It is important to discuss the challenges facing children in Togo that compound their food security for life.

A discussion of Togolese children requires me to describe the reality of human trafficking and domestic slavery rampant in the nation (Kohnert, 2021) that adds to Indigenous peoples' emotional labor (Appendix A) (L. Smith, 2012). While Togo is plagued by various human rights violations (Kohnert, 2021), child trafficking is perhaps the most illicit. As Kohnert (2021) clarified and as I have been told and witnessed in Togo, children—particularly girls—are trafficked nationally and internationally and there is little effort from the state to combat the issue. Still, "In 2019, officials reported identifying 225 child victims of trafficking (19 boys and

206 girls) and 87 adult victims (38 men and 49 women), compared with 118 child victims and 86 adult victims in 2018" (Kohnert, 2021, p. 16). While these numbers are staggering, I must reiterate that these are only the numbers reported by potentially corrupt officials and I assume the numbers are significantly higher, especially given the national trend of parents trafficking their own children for money (Kohnert, 2021) and military complicity in trafficking. In addition to trafficking, there is an alarming trend of child domestic and labor slavery in the nation (Kohnert, 2021). Kohnert (2021) notes that,

> The U.N. Special Rapporteur on contemporary forms of slavery revealed on 7 June 2019 in Dakar that an estimated 50,000 people were treated as slaves among the 7,4 m people of Togo. Thereby, Togo ranks 45th out of 167 countries on the Modern Slavery Index. Many children had been forced into domestic servitude or hard labour, driven by poverty and cultural tradition of '*confiage'* which involves sending a child to a relative or friend to attend school in a larger town or city. This could place children at risk of exploitation by internal human trafficking. Parents are often complicit in child trafficking, and many traditional chiefs and leaders do not discourage the practice. On the contrary, boys, known as *talibés*, are sent to Koranic schools for education and subsequently forced by their teachers to beg in the streets. (p.46)

I have seen and known child slaves, who often grow into adulthood as such. I was anxious anytime I heard of a child going to live with a relative, as that had connotation of something concerning, as Kohnert (2021) describes. Still, laws against these human crimes are reprehensibly insufficient (Kohnert, 2021). I must note further that female genital mutilation (FGM) at young ages is still reported in Togo (Kohnert, 2021). While FGM has declined significantly since officially becoming nationally illegal in 1998 (Kohnert, 2021), any remaining rates are concerning. FGM is most common during infancy and among Muslim communities (Kohnert, 2021) (approximately half of the nation) and I am also told by participants that the semi-nomadic Fulani people still practice FGM, though those rates likely are not reported. In 2013, more than 10% of women ages 40–45 had been genitally mutilated (Kohnert, 2021). These cultural and state norms are challenging to navigate as a Western cross-cultural researcher. It is

difficult to maintain ethical composure and decolonize an interview with a known child trafficker or to watch a young girl harassed by an older man and want to step in, for example. My role in Bikotiba has not been historically to fight trafficking, slavery, or other human rights violations. However, I wonder whether my role there or study of food access are insignificant without first addressing the human rights violations plaguing the nation and this community, with collaborators reporting Bassar as a child trafficking hub.

It goes without saying that being a child in Togo has concerning prospects that are worsened further by "formal" educational instability and inequitable access to that education. Today,

> While access to education has improved for girls, there are still severe disadvantages notably regarding secondary and higher education. Mean years of schooling of females was only half (3.3 years) of that of males (6.6 years). Just 27.6% of females (ages 25 and older) had at least some secondary education, against 54.0% of men. (Kohnert, 2021, p. 35)

Further, for all students, there is a staggering drop in enrollment between primary and secondary education, particularly in rural areas where secondary schools are sparse, costs are high, and teacher availability is unstable (Kohnert, 2021). As Kohnert (2021) mentions briefly, teacher strikes due to insufficient pay and poor working conditions have been occurring periodically since I was in Togo in 2013. This means that day-to-day for nearly a decade, students have not known whether they will have school, often arriving at the schoolhouse to find that the teachers are striking again, sometimes for weeks or months. When school is in session, corporal punishment is still the norm despite being outlawed, as reported to me by teachers and students, and as I have witnessed when a student gets something "wrong." Students further face far overcrowded classrooms, sometimes with 40–50 students to one teacher in a room meant to accommodate far fewer. Worse still, due to insufficient food access, I am told by collaborators

that students arrive to school hungry many days or miss school repeatedly due to farming or domestic responsibilities. Most rural secondary schools also do not have latrines, meaning girls have nowhere to go during the school day when menstruating and all students must relieve themselves in open fields or woods near the schools; many Togolese girls miss significant amounts of schooling due to menstruation. With the challenges of growing up in poverty in the nation, compared to the global average 56%, a Togolese child born today would have the chance to be,

> 43 percent as productive when she grows up as she could be if she enjoyed complete education and full health. This is higher than the average for Sub-Saharan Africa region and Low[-]income countries. Between 2010 and 2020, the [Human Capital Index] value for Togo increased from 0.37 to 0.43. (HCP, 2020, p.1)

Despite the massive challenges facing a child growing up in rural Bikotiba, children there are some of the most joyful, exuberant, and industrious, always finding ways to make anything, including a discarded can, into a toy or game. Still, as Western researchers, we must take note of the inequalities stemming from neocolonial globalization facing children like Baby Saye from a young age, perpetuating generational cycles of poverty and food insecurity.

This discussion brings me to an overall comment on the Togolese dictatorship, which has been fostered and overlooked internationally because of globalized capitalism, which does not care about the people suffering its consequences (Kohnert, 2021; Piot, 2010; Stiftung, 2016). The stories I tell here are meant to be realistic about threats and challenges to these farmers, most of which stem from the dictatorship by my estimation. I cannot discuss food access without commenting on the top-down global and state injustices (Appendix A) keeping Indigenous Togolese farmers impoverished and discarded. Stagnant agricultural policies in Togo have favored modernization and liberalization over time, with little focus on supporting the subsistence farmers that bolster the economy (Ali, 2017). Unfortunately, the corrupt political

state in Togo (Kohnert, 2021) lessens my hope for the Togolese ruling forces to better support these vulnerable farmers. It cannot go without reiterating the statement from Chapter III that in 2013, Togo was rated the lowest in overall life satisfaction of 149 countries (World Bank, n.d.), and I argue that the reason for such unhappiness is globalized, neocolonial, and top-down emotional and physical labor (Appendix A) imposed on the Togolese people. President Gnassingbé has dominated Togo since his father's dominion, which began in 1967 (Kohnert, 2021). Despite trying to rename his ruling party in the last decade under the guise of shifting from the dictatorship's old offenses, Gnassingbé has maintained the same overall values of top-down corruption, exploitation, and disregard of human rights that continue being ignored internationally (Kohnert, 2021) due to further globalized greed. Without extreme changes to the nation's top ruling forces, we cannot expect support or concern from the top for rural poor farmers like those in Bikotiba. These smallholder farmers represent the more than 60% of the Togolese population supporting the nation's economy (Kohnert, 2021). Therefore, local strategies, as discussed in Chapter IV, will be critical to enhance the community's resilience to climatic, environmental, and social changes.

Despite the challenges facing Bikotiba farmers from birth, their bright, bold, beautiful culture is steeped in rich history that shines through its men, women, and children. The Togolese are the most generous people that I have encountered, always willing to invite one into their homes for food or socializing. It is common to walk through Bikotiba and have people shout from their homes inviting me to eat, drink, or celebrate with them. Even in a community facing such dire food security threats, their generous culture means they would offer their food to any neighbor in need. In this way, the people of Bikotiba taught me a spirit of community and giving. I celebrate the rich, traditional Bassari history and cultural pride of fire dancing, relationships,

celebratory funerals, yams, charity, and so much more that have informed my own worldview for the better.

Implications and Opportunities

Subsistence Bikotiba farmers like Awusi and Ismael, made this research possible. Their peer community members welcomed Research Assistants and me into their homes graciously and with radical vulnerability (Nagar, 2015), sharing intimate details about their lives so their community could better understand their food access. The household food access interviews described in Chapter IV that Research Assistants and I developed and implemented together, facilitated an attempt at decolonizing (Appendix A) research to the greatest extent possible. Still, the process produced Western data, underscoring how Western scholars could never decolonize research fully, because research stems innately from the Western academy (L. Smith, 2012). Whether the community supports future research (as described in Chapter III) with me, or other Westerners, will help prove whether this attempt at decolonizing food systems research was sufficient to curb the latent oppressive tendencies of a scholar from the Global North (Pashby & Sund, 2020).

One of the greatest ways we decolonized this food systems research was to conduct all interviews and community meetings in the local language, Bassari (Appendix A). While "training" RAs was a powerful move on my part, as I discussed in Chapter II, it was essential to the RAs then being able to implement and foster interviews and community meetings in Bassari with minimal input from me. Therefore, I believe that such an exchange of knowledge was necessary with a few participants to best decolonize the whole research with all participants. By fostering Indigenous language (Windchief et al., 2018), the community and I were able to exchange more knowledge, trust each other more, and generate the best understanding possible of the community's food access (Appendix A). Whereas Westerners often enter communities

like Bikotiba, seek a translator, and preach to a community. I was told by some collaborators that there are also instances of researchers who only conduct interviews with those French-speaking literate to avoid the "complication" of local languages, which is a colonial perspective. I believe that my presence at all interviews, greeting and interacting with the participants in Bassari, and socializing with their families was the most ethical and culturally respectful approach. Had I not attended all interviews (except six due to my health), I do not believe I would have been showing sufficient respect and gratitude to participants, and it would otherwise have seemed more powerful to send RAs out alone "doing my bidding," while I relaxed upon my privileges. While I wonder whether my presence at interviews was too powerful and made participants hesitant and uncomfortable, I am glad I conducted the research in this fashion, and I recommend and would take similar approaches in future research.

Despite my intentions, not all of my attempts at decolonizing (L. Smith, 2012) were achieved, as described in Chapter II. As a radically vulnerable and reflexive feminist decolonizing scholar, I cannot allow my failed attempts to go without mention. My latent, Western-influenced ontology and epistemology still clouded the research at times. Examples include attempting a first community meeting format that was irrelevant in the Bikotiba context, with attempts at small group breakout activities and discussions. This effort failed and we adapted the meeting in the middle to foster what was working, the students telling their stories in their language (Appendix A). Therefore, instead of small group efforts at the next community meeting, we fostered the communal and relational (Appendix A) (L. Smith, 2012) nature of the Indigenous community to discuss their challenges and goals in a decolonized way. Other examples of weaknesses in my decolonizing approach include translating participant responses from their Indigenous language through two globalized languages and my notetaking and

observations during interviews, which could all have been powerful over participants. Further, the family I lived with during this research was a more powerful, wealthier one, representing one of the Indigenous political groups; this could have complicated my power balances with less wealthy participants or those from a different Indigenous grouping of the community. If I am invited for future research, I would live somewhere neutral to avoid such a complication.

This dissertation is a compelling example of an Indigenous community supporting research (Gruber, 2020; Kibler, 2020) with a Western scholar, as I described in Chapter III. This study created numerous opportunities for future decolonized food system inquires with the community, if I am welcomed, which would build on this research to develop a holistic understanding of the community's resilience to food insecurity over time (Alinovi et al., 2008; Bizikova et al., 2016; Boukary et al., 2016; Munawar et al., 2021). My specific recommendations for future research were clear throughout Chapters II–IV, whereas the opportunities I describe here are based on my unique and privileged relationship with the community of Bikotiba. Because I am a reflexive feminist scholar (Riach, 2009), my radical vulnerability (Nagar, 2015) and empathy (Nencel, 2014) could allow me to reengage the community having learned from past ethical failings; this could allow for more significant knowledge exchange and participant-researcher reciprocity (Appendix A) (Riach, 2009; L. Smith, 2012). In future studies, I hope to better foster decolonizing principles (Appendix A) (L. Smith, 2012) by: (a) nurturing participants claiming their stories of remembering and survival; (b) engaging participants more in research design to continue indigenizing the process to be most locally and culturally relevant; (c) fostering reconnections with traditional drought resistant crops that were overtaken by vulnerable maize globalization; (d) engaging participants in translating and writing their agricultural oral histories by eliminating my part in translating from French to English; (e)

committing to highlighting women in Bikotiba's essential role in resilience to food insecurity; (f) using knowledge we generate together to advocate for Indigenous subsistence farmers at the regional and state levels, in an effort to return ownership of Indigenous lands to their peoples; and (g) networking more with community members and regional stakeholders through snowball sampling and open-ended interviews (Dahlquist et al., 2007) to ensure that any research authentically represents and protects Indigenous knowledges and histories (L. Smith, 2012). I believe that any other approaches to Western research with the people of Bikotiba would be unjust (Appendix A). It is my ethical responsibility to use the knowledge I have gained in relating with the community of Bikotiba to further decolonize my research worldview and be an example for other scholars before they consider such collaborations. I must sufficiently respect, engage, and protect the Indigenous knowledge shared graciously with me. I believe that by continuing to share knowledge together in a decolonized, radically vulnerable, and radically empathetic way, the people of Bikotiba and I could together make strides toward improving their resilience to food insecurity.

Appendix

Appendix A – L. Smith's (2012) 45 Decolonizing Principles in Indigenous Projects

45 Decolonizing Principles in Indigenous Projects (L. Smith, 2012)	**Summaries from Multiple Sources**
Claiming	Embracing Indigenous histories and stories as a sense of justice, including claiming Indigenous knowledges in formal education (Fortier, 2017; L. Smith, 2012; Wane, 2005).
Testimonies	Related to claiming in that both target specific audiences, through which Indigenous peoples act as witnesses to their histories, often of violence perpetuated against them (L. Smith, 2012).
Storytelling	A critical foundation of Indigenous research through which elders claim power of their life stories; also a way to maintain intergenerational Indigenous knowledge (Battiste, 2008; Fortier, 2017; L. Smith, 2012; Wane, 2005).
Celebrating Survival	What L. Smith (2012) calls "survivrance" is Indigenous resistance against being portrayed based on only demises of Indigenous societies versus their strength and survival (Fortier, 2017).
Remembering	Recalling painful experiences of Indigenous peoples for whom their memories have not been dismantled through lack of Colonial empathy (Fortier, 2017; L. Smith, 2012).
Indigenizing	Could occur by non-Indigenous peoples trying to center research on Indigenous realities or by Indigenous peoples acting on behalf of their cultures (le Grange, 2018; L. Smith, 2012).

Intervening	A choice to act for change, which is often valuable for communities facing external threats. Historically used to oppress Indigenous peoples (L. Smith, 2012).
Revitalizing	Unveiling Indigenous cultures that have been suppressed through colonization such as languages, in particular (Battiste, 2008; Denzin et al., 2008; L. Smith, 2012).
Connecting	Most Indigenous societies are holistic and based on connections with not just other humans, but with land and animals too (Battiste, 2008; Chuwa, 2014; L. Smith, 2012). Also, an effort to reconnect Indigenous peoples with aspects of their cultures stripped from them historically (L. Smith, 2012). Non-Indigenous researchers are responsible for assuring that their methods are humanizing (A. Abdi, 2010; Paris & Winn, 2014; L. Smith, 2012).
Reading	Assessing Western histories and educations presented to Indigenous peoples is something that Western researchers are responsible for. Reading literature with an eye toward critical race theory and decolonization (Chilisa, 2012; Denzin et al., 2008; L. Smith, 2012).
Writing	Literary expressions of Indigenous histories, ideally led by Indigenous scholars (Battiste, 2008; L. Smith, 2012; Wane, 2005).
Representing	The inherent rights of Indigenous peoples to be depicted truthfully by Westerners (L. Smith, 2012; Thambinathan & Kinsella, 2021). Reincorporating Indigenous peoples into decision-making and self-determination (L. Smith, 2012; Thambinathan & Kinsella, 2021).

Gendering	Colonialism destroyed relationships between Indigenous peoples of different genders, minimizing women and disrupting harmony in Indigenous societies (L. Smith, 2012).
Envisioning	A collective exercise of Indigenous peoples embracing their survivrance and claiming power to envision the futures they seek for the next generations (Denzin et al., 2008; L. Smith, 2012).
Reframing	Claiming power over how Indigenous issues are perceived, such as urging State governments to recognize that Indigenous societies' histories are real and relevant for more than just the Indigenous communities (L. Smith, 2012).
Restoring	Indigenous peoples have been oppressed historically, from imprisonment to slavery (L. Smith, 2012). Restoration focuses on healthy Indigenous communities, with wellbeing and health as guiding principles (L. Smith, 2012).
Returning	Like claiming, returning is Indigenous peoples reasserting ownership of their environments and societies that were dismantled and taken via colonialism (L. Smith, 2012).
Democratizing	Eliminating colonial influence from Indigenous governance (L. Smith, 2012).
Networking	The process of building networks, relationships, and connections. Doing so is resistance for Indigenous peoples with State oversight to share their unique knowledges (Fortier, 2017; L. Smith, 2012).

Naming	Renaming sights, activities, people, and more based on how they were defined originally by Indigenous communities, not how they were colonized by Western languages (L. Smith, 2012).
Protecting	Safeguarding Indigenous cultures, sacred places, and people from exploitation and harm (Battiste, 2008; Denzin et al., 2008; L. Smith, 2012).
Creating	Examples of collective Indigenous creativity are visible historically, and imagination for the future is strong and relies on Indigenous peoples to solve their challenges (L. Smith, 2012).
Negotiating	Indigenous peoples make deals that safeguard their self-respect and honor their traditions. Focus on Indigenous self-determination (L. Smith, 2012; Thambinathan & Kinsella, 2021).
Discovering	Indigenous people learning about Western science in combination with their knowledge systems to plan their lives (L. Smith, 2012).
Sharing	Inter-Indigenous knowledge sharing builds shared understanding and resistance. Knowledge shared between Indigenous and non-Indigenous peoples must focus on Indigenous ways of knowing and sharing new knowledge openly in locally relevant ways (Adams et al., 2014; Battiste, 2008; L. Smith, 2012; Wane, 2005).
Loving	Practicing decolonization and exploring relationships with love through critical reflexivity, mourning, and humility (Boon et al., 2018a; L. Smith, 2012)

Healing	Cultural context for Indigenous problem solving (Hickerson, 2018; L. Smith, 2012).
Letting Go	Abandoning colonial power imbalances, which is "necessarily violent; physically, epistemologically and ontologically" (L. Smith, 2012, p. 191). This requires Indigenous peoples to humanize their colonizers (L. Smith, 2012).
Relationships	A key ethical worldview common to many Indigenous peoples that goes beyond humanizing another and is counter to capitalistic worldviews (L. Smith, 2012; Stimeling & Enriquez, 2019). Different Indigenous groups define relationships differently (L. Smith, 2012).
Positioning	Researchers must clearly identify their positions—race, nationality, gender, class, etc.—in relation to Indigenous collaborators (L. Smith, 2012). Part of the researcher's "praxis that connects theory, action and reflection" (L. Smith, 2012, p. 193) to understand their situation within the Indigenous context, thereby enhancing potential relationships (Nencel, 2014) and research ethics (L. Smith, 2012).
Re-Scaping	Using Indigenous knowledge to restore traditional relationships with their lands that have been ravaged by capitalism (Boon et al., 2018b; L. Smith, 2012).
Designing	"Engineering Indigenous solutions" to complex challenges based on their aesthetic preferences and historic successes doing so (L. Smith, 2012, p. 195).

Retracing	A process of reclaiming power by reflecting on and honoring the suffering of prior generations (L. Smith, 2012).
Refreshing	"Intergenerational transfer of knowledge and power" to refresh long-standing Indigenous organizations (L. Smith, 2012, p. 196).
Economic Development	Invigorating Indigenous businesses to display cultural identities proudly (L. Smith, 2012).
Indigenize Consciousness	A process of Indigenous people questioning the colonial influences in their mindsets, honoring their intuitions, and reasserting their voices on matters for which colonizers have silenced them historically (L. Smith, 2012).
Generational Instructions	Sharing Indigenous ancestral wisdom with current generations and encouraging that sharing with future generations (L. Smith, 2012).
Re-Establish Food Systems	Reclaiming power over how Indigenous people nourish themselves and breaking from capitalistic globalized food production that benefits the colonizer (FNDI, 2013; L. Smith, 2012).
Reject Incarceration	Oppose colonial corporal punishment norms that unequally imprison Indigenous peoples (L. Smith, 2012).
Reorient Knowledge	Historical colonial scholarship from the Western academy should be dismissed as the primary reference point for education and engendering Indigenous knowledge (L. Smith, 2012).

Seek Justice	Seeking justice for the historical state and international crimes and corruption that have plagued and led to the disappearance and murder of Indigenous peoples globally (L. Smith, 2012).
"Refocusing Emotional and Cultural Labor"	Indigenous peoples suffer the emotional labor of their past and continued colonization and, "It is a major issue as Indigenous people are often motivated to help their own communities but are hindered by the sheer exhaustion of this hidden workload" (L. Smith, 2012, p. 205).
"Listening to, Feeling and Learning from the Land"	Attending to and protecting natural resources (L. Smith, 2012).
Counting & Discounting	Counting what matters—e.g., numbers of Indigenous people murdered or valuable Indigenous mathematics—and discounting what does not—e.g., colonial privilege (L. Smith, 2012).
Co-Produce Knowledge	Synthesizing Indigenous knowledge and Western science ethically presents opportunities to work on local goals (L. Smith, 2012).

Appendix B – English and French Interview Forms

Interview Form - English

District: Is the participant: Male Female Participant age:	Interview Number:
1. How many people live in this home?	Total: Number of men: Less than age 10: Number of women: Between age 11-17: Between age 18-50: Greater than age 50:
2. Does anyone live here for only part of the year?	Yes No If yes, explain when and why:
3. Do the children eat the same number of times each day?	The number: How many meals do they buy? How many of their meals are prepared at home? Is this the same all year? Yes No If no, why?
4. How many times per day do you eat?	The number: Is this the same all year? Yes No If no, why?
5. Do you have a husband/wife? If yes, how many times do they eat each day?	Yes No The number: Is this the same all year? Yes No If no, why?
6. Approximately, how many times per month does your family buy meat?	
7. When you buy meat, does everyone in the family eat it?	Yes No If no, why?
8. When do you decide to buy meat?	

9. Do you practice animal husbandry?	Yes No If yes, why? If yes, do you kill the animals to eat? Yes No If yes, when?
10. What crops does your family produce?	
11. How many hectares do you have for each crop?	
12. Are there crops that adapt to drought?	Yes No If yes, what crops? How do those crops adapt?
13. How do you decide how much of your crops to sell each year? Is this the same each year?	 Yes No If no, why?
14. Explain how you rotate crops (what crops during what months). Why do you rotate your crops this way?	
15. Do you grow fruits?	Yes No If yes, what types? If yes, where?
16. Do you grow vegetables?	Yes No If yes, what types? If yes, where?
17. Does anyone in your family sleep at the farm?	Yes No If yes, who sleeps there most?

	If yes, approximately how many times do they sleep there per month? If yes, why do they sleep there?
18. Approximately, what is the distance in kilometers between Bikotiba and your farm?	
19. What do you eat at the farm?	
20. Do you own your farm?	Yes No If no, explain who owns your farm.
21. Do you have problems with crop pests?	Yes No If yes, explain.
22. In your family, do you have:	Electricity? Yes No A TV? Yes No A DVD Player? Yes No A Radio? Yes No A Cell Phone? Yes No A Motorcycle? Yes No A Car? Yes No A Fridge? Yes No A Fan? Yes No A Latrine ? Yes No
23. Do you have money saved for emergencies?	Yes No Why?
24. Who controls the family money?	
25. Is there someone who lives here with a job?	Yes No If yes, what type(s) of job(s)? Approximately how much money do they earn from the job each month?
26. Approximately how much money do	Rainy Season:

you earn from agriculture during:	Dry Season:
27. Each week, how much money do you spend on food?	
28. Do you use money from agriculture to buy food? Do you use money from a job to buy food? Do you use money from friends or family to buy food? Do you use money from the government to buy food? Do you use any other money to buy food?	Yes No Yes No Yes No Yes No Yes No If yes, what money?
29. During the last five years, have you noticed any changes to the agricultural soils?	Yes No If yes, explain the changes.
30. During the last five years, have you noticed any weather changes?	Yes No If yes, explain the changes.
31. How much does fertilizer cost when it is:	The most expensive? The least expensive?
32. Why does the price of fertilizer change?	Please explain:
33. What do you do when fertilizer price changes?	
34. Do you practice agriculture the same way as your parents did?	Yes No If no, explain the differences.
35. During your lifetime, have you	Yes Non

changed the way you practice agriculture for any reason?	If yes, what did you change in response to?
36. What do you do if your crops fail?	
37. Tell me your five main concerns about food and agriculture.	1. 2. 3. 4. 5.
38. What is climate change?	

Interview Form – French

Le quartier : Le numéro d'enquête : Le participant est (sont) : un homme une femme L'âge(s) du participant(s) :	
1. Combien de personnes vivent dans cette maison ?	Total : Les garçons : Moins de 10 ans : Les femmes : Entre 11-17 ans : Entre 18-50 ans : Plus de 50 ans :
2. Est-ce qu'il y'a quelqu'un qui vivent ici pour une partie de l'année seulement ?	Oui Non Si oui, expliquer quand et pourquoi :
3. Les enfants mangent combien des fois par jour ?	Le numéro : Ils acheter combien des repas ? Combien des repas sont préparé à la maison ? Est-ce que c'est le même toute l'année ? Oui Non Si non, pourquoi ?
4. Vous mangez combien des fois par jour ?	Le numéro : Est-ce que c'est le même toute l'année ? Oui Non Si non, pourquoi ?
5. Avez-vous une femme/un mari ? Si oui, il/elle mange combien des fois par jour ?	Oui Non Le numéro : Est-ce que c'est le même toute l'année ? Oui Non Si non, pourquoi ?
6. Approximativement, votre famille achète la viande combien des fois par mois ?	
7. Quand il y'a la viande, est-ce que tout le monde dans la famille mange la viande ?	Oui Non Si non, pourquoi ?
8. Vous achetez la viande a quels moments ?	
9. Pratiquez-vous l'élevage ?	Oui Non Si oui, pourquoi ? Si oui, est-ce que vous tuez les animaux pour

	manger ? Oui Non Si oui, quand ?
10. Votre famille produit quels types des récoltes ?	
11. Combien d'hectares de chaque culture ?	
12. Est-ce qu'il y'a les cultures qui s'adapter avec la sécheresse ?	Oui Non Si oui, expliquer comment ils s'adapter :
13. Comment décidez-vous combien des récoltes à vendre chaque année ?	 Est-ce que c'est le même chaque année ? Oui Non Si non, expliquer :
14. Expliquez votre rotation des cultures (quels types des cultures, quels mois) ?	 Pourquoi vous faites la rotation comme ça ?
15. Cultivez-vous des fruits ?	Oui Non Si oui, quels types ? Si oui, où ?
16. Cultivez-vous des légumes ?	Oui Non Si oui, quels types ? Si oui, où ?
17. Est-ce qu'il y'a quelqu'un dans votre famille qui dorment au champ ?	Oui Non Si oui, qui dort au champ le plus part ? Si oui, approximativement, ils dorment au champ combien des fois par mois ? Si oui, ils dorment au champ pourquoi ?
18. Vos champs sont à quelle distance du Bikotiba ?	
19. Qu'est-ce que vous mangez au champ ?	

20. Est-ce que vous êtes la propriétaire de vos champs ?	Oui Non Si non, expliquer la possession de vos champs :
21. Avez-vous des problèmes avec les ravageurs ?	Oui Non Si oui, expliquer :
22. Dans votre famille, avez-vous :	Le courant ? Oui Non Une télévision ? Oui Non Un lecteur vidéo ? Oui Non Une radio ? Oui Non Un portable ? Oui Non Une moto ? Oui Non Une voiture ? Oui Non Un frigo ? Oui Non Un ventilateur ? Oui Non Une latrine ? Oui Non
23. Avez-vous l'argent économisé pour les urgences ?	Oui Non Pourquoi ?
24. Qui contrôle l'argent de la famille ?	
25. Est-ce qu'il y'a quelqu'un qui vivent ici avec un job ?	Oui Non Si oui, quels types du job ? Approximativement, combien d'argent gagnez-vous de ces jobs chaque mois ?
26. Approximativement, combien d'argent gagnez-vous de l'agriculture pendant :	La saison des pluies : La saison sèche :
27. Chaque semaine, vous dépensez combien d'argent en nourriture ?	
28. Est-ce que vous utilisez l'argent d'agriculture pour acheter de la nourriture ? Est-ce que vous utilisez l'argent d'un job	Oui Non Oui Non

pour acheter de la nourriture ? Est-ce que vous utilisez l'argent d'amis or de famille pour acheter de la nourriture ? Est-ce que vous utilisez l'argent du gouvernement pour acheter de la nourriture ? Est-ce que vous utilisez quelque autre argent pour acheter de la nourriture ?	 Oui Non Oui Non Oui Non Si oui, quel argent ?
29. Pendant les cinq années passes, avez-vous remarqué des changements dans les sols agricoles ?	Oui Non Si oui, expliquer les changes :
30. Pendant les cinq années passes, avez-vous remarqué des changements dans les météos ?	Oui Non Si oui, expliquer les changes :
31. L'engrais coute combien quand c'est :	Le plus cher ? Le moins cher ?
32. Pourquoi le prix d'engrais change ?	
33. Vous faites quoi quand le prix d'engrais change ?	
34. Pratiquez-vous l'agriculture de la même façon que vos parents ont faite ?	Oui Non Si non, expliquez les différences.
35. Pendant votre vie, avez-vous changé la façon dont vous produisez des récoltes en réponse à quelque chose ?	Oui Non Si oui, vous avez changé en réponse de quoi :
36. Vous faites quoi quand il y'a le panne de récolte ?	
37. Dites-moi vos cinq premières préoccupations à-propos la nourriture et l'agriculture.	1. 2. 3.

	4. 5.
38. Le changement climatique c'est quoi ?	

Appendix C – Household Interview Consent Script

English

Read to participant for consent:

We are here for a project with Saye[38]. Saye was a Peace Corps volunteer between 2011-2013. Now she is continuing her studies in the United States on the subject of food security. She would like to ask you some questions for her studies.

The goal of this project is to better understand how the people of Bikotiba access food, their difficulties accessing food, and the strengths of food security in Bikotiba. She hopes to do this interview with many houses in Bikotiba. After these interviews, we will invite you to community meetings to discuss challenges of food security and actions the community can do to find a sustainable future. She will use the information from your responses and all responses from the houses in Bikotiba to report what we learned to the scientific community so others can learn from your story. We are not going to write your name, so after this interview someone is not going to know your personal answers. Also, Saye's assistants promise to not talk about your answers with others in the community. Before she leaves in May, Saye and assistants will share what we learned from the community interviews with all of you.

You are not obligated participate. If you choose to not participate, there are no consequences. If you agree to this interview, we will ask you some questions. One person will ask you the questions in Bassari, another will write your answers in French. Saye is here to observe. We hope you will be honest in your answers. There are no right or wrong answers - all of them are important. It will take approximately 30—45 minutes of time. If you have concerns, please discuss them with Ismael (pseudonym) who will help us find a solution and who can

[38] The local name given to me by the community meaning "second daughter."

communicate with my supervisor in the United States. Do you have any questions? Do you agree to participate?

If the participant replied yes to participate, RA sign name here confirming:

The date:

French

Lire au participant pour consentement:

Nous sommes ici pour un projet avec Saye. Saye était un volontaire du Corps de la Paix entre 2011-2013. Maintenant elle continue ses études aux Etats-Unis sur le sujet de sécurité alimentaire. Elle voudrait vous-demandez quelques questions pour ses études.

Le but du projet est de comprendre meilleure à propos comment les gens du Bikotiba accès la nourriture, leurs difficultés d'accès la nourriture, et les force de la sécurité alimentaire à Bikotiba. Elle espère de faire cette enquête avec beaucoup des maisons a Bikotiba. Avec ces enquêtes, nous allons vous invitez aux réunions communautaires à discuter des défis de la sécurité alimentaire et de certaines actions que la communauté peut faire pour trouver un avenir durable. Elle va utiliser l'informations de vos réponses et toutes les réponses des maisons du Bikotiba à faire un report pour la communauté scientifique comme les autres peut apprendre de votre historie. On ne va pas écrire votre nom, donc après cette enquête quelqu'un ne vas pas connaitre vos réponses personnelles. Aussi, les assistants du Saye promis de ne vont pas parler à propos vos réponses avec les autres dans la communauté. Avant de partir en mai, Saye et assistants vont partageons ce qu'ils ont appris des enquêtes à propos la communauté avec vous tous.

Vous ne dois pas participer. Si vous choisir à ne participer pas, il n'y a pas des conséquences. Si vous êtes d'accord avec cette enquête on va vous demandez quelques questions. Une personne va vous demandez les questions en Bassari, un autre va écrire vos réponses en Français. Saye est ici pour s'observer. Nous espérons que vous allez être honnête dans vos réponses. Il n'y a pas des bonnes ou bien mauvais réponse – toutes l'information sont importantes. Approximativement ça va prend 30—45 minutes du temps. Si vous avez des

préoccupations, veuillez en discuter avec Ismael (pseudonyme) qui nous aidera à trouver une solution et qui pourra communiquer avec mon superviseur aux États-Unis. Avez-vous des questions ? Est-ce que vous êtes d'accord à participer ?

S'ils ont dit oui à participer, RA écrit nom ici de confirmer:

Le date :

Appendix D – Community Meeting Consent Script (Student Example)

English

Read to participants for consent:

We are here for a project with Saye. Saye was a Peace Corps volunteer between 2011-2013. Now she is continuing her studies in the United States on the subject of food security. The goal of the project is to better understand how the people of Bikotiba access food, their difficulties in accessing food, and the strengths of food security in Bikotiba. She hopes to do this meeting also with groups of elder men and women in Bikotiba. At these meetings, we thought we can discuss the climate change warnings for West Africa and your goals for the community in the future. She will use the information we discuss to report to the scientific community as others can learn from our story. We are not going to write your name, so after this meeting someone is not going to know your personal comments. Also, Saye's assistants promise not to talk about this meeting with others in the community. Before she leaves in May, Saye and assistants will share what they learned from the interviews and meetings about the community with all of you.

You do not have to participate. If you choose not to participate, there are no consequences. If you agree with this meeting, we hope you will be honest in your answers. There are no right or wrong answers - all information is important. If you have any concerns, please discuss them with Ismael (pseudonym) who will help us find a solution and who can contact my supervisor in the United States.

Do you have any questions ? Do you agree to participate? If not, please leave now, with my thanks.

If you agree to stay, Saye will take photos that she might use in public reports. Are you still willing to participate? If not, please leave now, with my thanks.

French

Lire au participant pour consentement :

Nous sommes ici pour un projet avec Saye. Saye était un volontaire du Corps de la Paix entre 2011-2013. Maintenant elle continue ses études aux Etats-Unis sur le sujet de sécurité alimentaire. Le but du projet est de comprendre meilleure à propos comment les gens du Bikotiba accès la nourriture, leurs difficultés d'accès la nourriture, et les force de la sécurité alimentaire à Bikotiba. Elle espère de faire cette réunion également des groupes d'hommes et de femmes âgés a Bikotiba. Aux ces réunions, nous ont pensons que nous pouvons discuter les avertissements de changement climatique pour l'Afrique de l'Ouest et vos objectifs pour la communauté à l'avenir. Elle va utiliser l'informations de nous discutons à faire un report pour la communauté scientifique comme les autres peut apprendre de votre historie. On ne va pas écrire votre nom, donc après cette enquête quelqu'un ne vas pas connaitre vos réponses personnelles. Aussi, les assistants du Saye promis de ne vont pas parler à propos vos réponses avec les autres dans la communauté. Avant de partir en mai, Saye et assistants vont partageons ce qu'ils ont appris des enquêtes et réunions à propos la communauté avec vous tous.

Vous ne dois pas participer. Si vous choisir à ne participer pas, il n'y a pas des conséquences. Si vous êtes d'accord avec cette réunion nous espérons que vous allez être honnête dans vos réponses. Il n'y a pas des bonnes ou bien mauvais réponse – toutes l'information sont importantes. Si vous avez des préoccupations, veuillez en discuter avec Ismael (pseudonyme) qui nous aidera à trouver une solution et qui pourra communiquer avec mon superviseur aux États-Unis.

Avez-vous des questions ? Est-ce que vous êtes d'accord à participer ? Si non, laissez maintenant, s'il vous plait, avec mes remerciements.

Si vous acceptez de rester, Saye prendra des photos qu'elle possible pourrait utiliser dans des rapports publics. Êtes-vous toujours d'accord pour participer ? Si non, s'il vous plaît laissez maintenant, avec mes remerciements.

Appendix E – Research Assistant Engagement and Interview Development

Assistants acknowledged prior and informed consent (Appendix F) before mutual learning meetings and anecdotally expressed enjoying the process. Key topics of focus that I shared included: my role in this research, the goal of this research, the RAs' role, our advisor's role, how to explain and request informed consent, not guiding participants to "right" answers and instead fostering authentic responses, not interrupting participant's responses unless necessary (i.e., entirely off topic), never hesitating to ask me clarifying questions or for help, not rushing participants, only asking one question at a time, ensuring that participants understood and answered primary questions before continuing to ask them sub-questions, sensitivity, respect, and confidentiality. I was ultimately trained through this process as well because RAs taught me more about the culture and what would not work in the context.

In developing the interview tool on household food access together, RAs and I went through a revisions and pilot testing process, through which there were six revisions as follows:

1. Revision following mock interview with local advisor using my first draft. I asked the questions in French while RAs watched and listened.
2. Practice and revision of second draft with RAs and I only, followed by one pilot interview with a neighbor.
3. RAs tested the interview on each other and reported challenges for revision.
4. I Invited three pilot participants from the neighboring towns, who spoke Bassari and French. Each of the three RA teams practiced the interview three times with each participant and challenges led to revision.
5. Three supervised pilot interviews in each village district led to revision.
6. We made minor adaptations to the interview after the first three full days of interviewing to ensure questions were being asked as clearly as possible.

We maintained some questions that seemed irrelevant upon implementation to confirm my perceived understanding of cultural norms. For example, the interview question, "How do you decide how much crops to keep or sell each year?" was maintained throughout the interviews despite almost uniform answers; participants indicated overwhelmingly that the husband and wife keep enough to feed everyone for the year and then they decide to sell crops from storage when money is needed. Other questions were added throughout the pilot process as I learned more about the community. Some questions were excluded ultimately due contextual irrelevance or redundancies.

This one-month process of testing and revising the interview tool before implementing it widely in the community proved critical for three reasons: linguistic, contextual, and methodological. First, it was obvious that many questions I drafted did not translate well in Bikotiba either due to overly technical French or my misunderstanding of how to best ask questions in Bassari. For example, the overly complicated French phrase I used first asking, “Does land tenure affect your ability to produce food?” meant little to participants because the formal term "land tenure" was irrelevant when one could simply ask, “Do you own your farm.” Second, despite linguistic challenges, this process showed that my prior understanding of Bikotiba's context was essential to the methodological soundness of this study. If I had not that prior knowledge, then developing this interview tool would have been much more difficult and implementing the interviews would have been methodologically unsound. My privileged knowledge about Bikotiba in advance built the foundation of trust and mutual understanding that I believe participants deserved and that made this study as methodologically sound as possible in this context (Kibler, 2020).

Appendix F – Research Assistant Consent Script

This project is with Katie Kibler (Saye) between March 3, 2018 and May 23, 2018. The goal of the project is to understand how the people of Bikotiba access food and to assess the sustainability of food access in the future. You were nominated by the community to be my research assistants. I will train you in how to ask the questions of the interviews to the families of Bikotiba. Then you will help me with the interviews at each house in Bikotiba. You do not have to participate, you are not obligated. If you choose not to participate, there will be no consequences and I will not be mad. You can choose not to participate any time and tell me that. I can give you 7,000 CFA per month of participation (three months in total). Also, for each month of participation I will give you 2,000 CFA of cell phone credit for our communications. When we have the meetings together, I will provide small meals. This project is for my education, and I will share this project with others who can learn from us. I will not share your names in the reports of this project. If you sign this consent form, you agree that I can use photos of you and our activities. If you sign up, my expectations for you are:

- Help me do the interview translations between French and Bassari.
- Help me choose the right times for our meetings.
- Try to be on time for our meetings. If you can't, call me right away.
- Communicate well with me and the other assistants. Tell me if there is a problem. Always be honest with me.
- Do not share interview information with others in the community. Always keep the privacy of families we interview.

Please ask me questions before signing your name.

If there is a problem, you should speak with Ismael (pseudonym) who will help us find the solution and can communicate with my supervisor in the United States.

By signing, I _____ understand and am agreeing with everything written and I want to participate.

_____ _____ _____

Sign your name here the date your phone number

French

Le projet avec KIBLER Katie (Saye) entre 3 Mars 2018 et 23 Mai 2018. Le but de projet est de comprendre comment les gens de Bikotiba gagne la nourriture pour évaluer la durabilité de accès a la nourriture dans la future. La communauté a vous-nominez d'être mes assistants de recherche. Je vais vous forme a comment posée les questions des enquêtes aux familles du Bikotiba. Après vous allez m'aider à faire les enquêtes à chaque maison de Bikotiba. Vous ne devez pas participer, vous n'étés pas obliger. Si vous choisir à ne participer pas, il n'y aura pas des conséquences et je ne serai pas fâche. Vous pouvez choisir à ne participer pas à tous les moments et me dire ça. Je peux vous donnez 5,000 CFA par mois de participation (trois mois en totale). Aussi, pour chaque mois de participation je vais vous donner 2,000 CFA par crédit du portable pour nos communications. Aussi, quand nous avons les réunions ensemble, je fournirai les petits repas. Ce projet et pour mes études et je vais faire un report de ce projet et partager ça avec les autres qui peuvent apprendre de nous. Je ne vais pas partager vos noms dans les reports de ce projet. Mais, si vous signer cette forme du consentement, je peux utiliser les photos de vous et nos activités. Si vous signe, mes attentes pour vous sont :

- Aidez-moi a faire les traductions d'enquête entre Français et Bassari.
- Aidez-moi a choisir les bons temps for nos réunions.
- Essayer d'être à l'heure for nos réunions. Si vous ne pouvez pas, m'appeler toute suite.
- Bien communique avec moi et les autres assistants. Dis-moi s'il y a un problème. Etre toujours honnête avec moi.
- Ne partager l'information des enquêtes avec les autres dans la communauté. Gardez toujours la vie privée des familles nous posons ces enquêtes.

S'il vous plait, posez-moi des questions avant de signe votre nom.

S’il y a un problème il faut parler avec DARE Gbandi qui va nous aidez a trouvez la solution et pourra communiquer avec mon superviseur aux États-Unis.

Par signer, moi _____, je comprendre et je suis d’accord avec tous ce
(Ecrivez votre nom ici)
qui précède et je voudrais participer.

_____	_____	_____
(Signe votre nom ici)	(Ecrivez la date)	(Ecrivez votre numéro)

Appendix G – Permissions

I received the following communication from then Chair of the Institutional Review Board (IRB) at Antioch University New England, Kevin Lyness, on January 23, 2018, in response to an IRB application called *A Participatory Assessment of Household Agricultural Resilience to Food Insecurity - The Case of Food Access in Bikotiba, Togo* submitted by Katryna M. Kibler on January 10, 2018.

Katryna,

The IRB had determined that your study does not meet the definition of "research" that would merit review by the IRB. Because the purpose of your project is to improve that community your project isn't intended to produce "generalizable knowledge". As a result of this, your project does not require IRB review or approval. You are free to work with your chair and proceed with this project without IRB oversight.

Kevin Lyness, Chair AUNE IRB

On Tue, Jan 23, 2018 at 8:25 AM, [redacted] wrote:

> Dear Katryna Kibler ,
> As Chair of the Institutional Review Board (IRB) for Antioch University New England, I am letting you know that the committee has reviewed your Ethics Application. It has been determined that your project does not meet the requirements as defined.
> Please log into the IRB Center at irb.antioch.edu for details regarding your application.
> Sincerely,
> Kevin Lyness

I received the following communication from James Gruber, Author of *Building Community: 12 Principles for a Health Future* published by New Society, indicating the permission of both entities to use my case study published in the book as a chapter of my dissertation.

Dear Katie [redacted]

With this email I would like to confirm that Katryna Kibler has the my permission, as the author of *Building Community - Twelve Principles for a Healthy Future, published by* New Society Publishers to publish her case study in the open access databases AURA (Antioch University Repository and Archive) and OhioLINK, as well as the commercial database ProQuest Dissertations and Theses. I hold full copyright to this book.

Sincerely,

[redacted]

James S. Gruber, PE, PhD
Professor Emeritus, Environmental Studies, Antioch University New England
Member IUCN, Commission on Economic, Environmental, and Social Policy
Recently released book: BUILDING COMMUNITY

Appendix H – Normality Statistics

Results generated by the XLSTAT software (Addinsoft, 2021) for Shapiro-Wilk, Anderson-Darling, Lilliefors, and Jarque-Bera tests of non-normality, shown below, confirmed the statistically significant nonnormality ($\alpha = 0.05$) of this exploratory data for all variables. Values in bold are statistically significant, indicating the variable distribution is non-normal. Values in red are closer to alpha and therefore normality.

Variable\Test	Shapiro-Wilk	Anderson-Darling	Lilliefors	Jarque-Bera
Count of Male Residents	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Count of Female Residents	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Age < 10 (years old)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Age 11-17 (years old)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Age 18-50 (years old)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Age > 50 (years old)	**<0.0001**	**<0.0001**	**<0.0001**	**0.002**
Distance to Farm (km)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Corn (ha)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Tubers (ha)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Other Grains (ha)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Legumes (ha)	**<0.0001**	**<0.0001**	**<0.0001**	**0.000**
Vegetables	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Distance to Farm (km)	**<0.0001**	**0.006**	**0.037**	**<0.0001**
Food:Income (%)	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Crops Pests	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Farm Ownership	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Farm Workers	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Soil Changes	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Weather Changes	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Job	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Savings	**<0.0001**	**<0.0001**	**<0.0001**	**0.000**
Livestock	**<0.0001**	**<0.0001**	**<0.0001**	**0.001**
Asset	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Money Control	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Sleep at Farm	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**
Farm Different than Parents	**<0.0001**	**<0.0001**	**0.000**	**<0.0001**
Farm Changes during Lifetime	**<0.0001**	**<0.0001**	**<0.0001**	**0.000**

Appendix I – Outlier Detection

Two sub-datasets of quantitative variables were assessed for outliers with the Fast Minimum Covariance Determinant (MCD) in RStudio (2020) due to unacceptable multicollinearity (Rousseeuw & Van Driessen, 1999) when both were assessed together. The first subset included household age demographics and the second gender demographics; both in addition to the common crop and farm quantitative data. To maintain a reasonable sample size for subsequent statistical analyses, I chose to exclude the first 10 common outliers within the first 12 of each subset, resulting in a sample of 100 observations for further statistical analyses. XLSTAT (Addinsoft, 2021) also outputs factor maps for observations as explained in Appendix K. I assessed for anomalies at each modeling stage and no household outliers appeared significant enough that I felt compelled to exclude further outliers.

For the Fast MCD, Distance-Distance plots from the robustbase package (Maechler et al., 2021) showed the classic Mahalanobis distance[39] versus the robust distance to visualize outliers (Figure I.1). The adjusted quantile (Figure I.2) and chi square (Figure I.3) plots of the mvoutlier package (Filzmoser & Moritz, 2018) were also indicators for outlier exclusion. Chi square plots were notable, allowing visualization of changes in the plot as each outlier with the highest robust Mahalanobis distance was removed from the dataset. Results shown below are for the Fast MCD data subset including ages.

[39] Mahalanobis distance is a statistical metric useful for multivariate data covariance matrices (Cabana et al., 2019; Filzmoser & Moritz, 2018). It provides insight into statistically significant distance between data points (Cabana et al., 2019; Filzmoser & Moritz, 2018). However, masking and swamping of the data are possible when high classic Mahalanobis distance are not actual outliers, which is why the robust alternative used in this study was developed (Cabana et al., 2019; Filzmoser & Moritz, 2018).

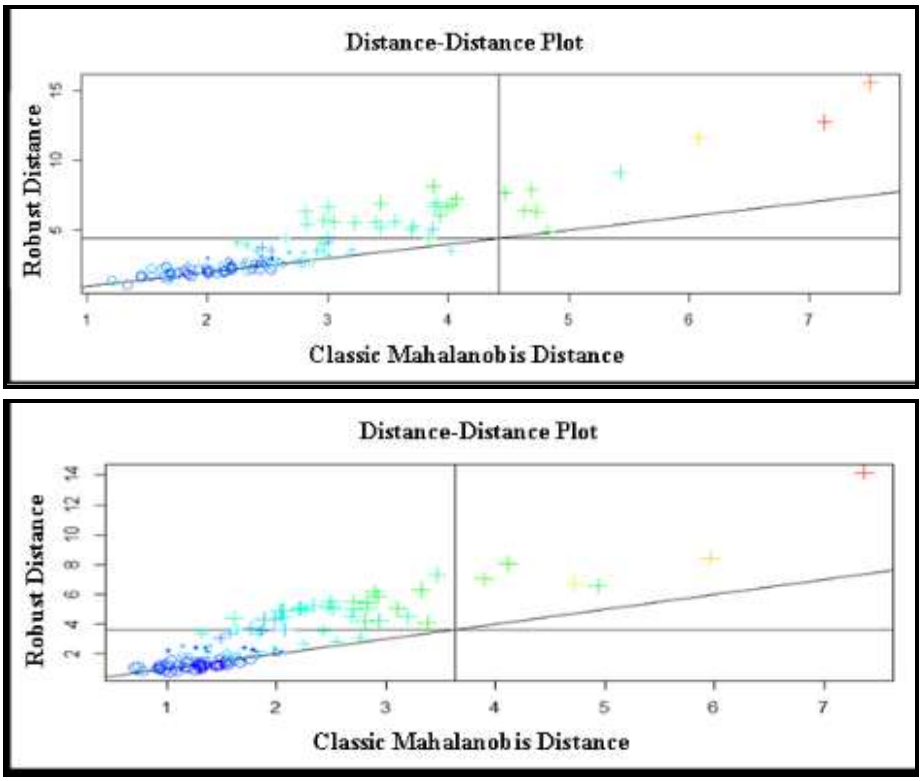

Figure I.1. Classic Mahalanobis distance versus Robust Mahalanobis distance plots before (top) and after (bottom) outlier exclusion. Produced using RStudio and the robustbase package (Maechler et al., 2021; RStudio Team, 2020), and Microsoft Office Publisher.

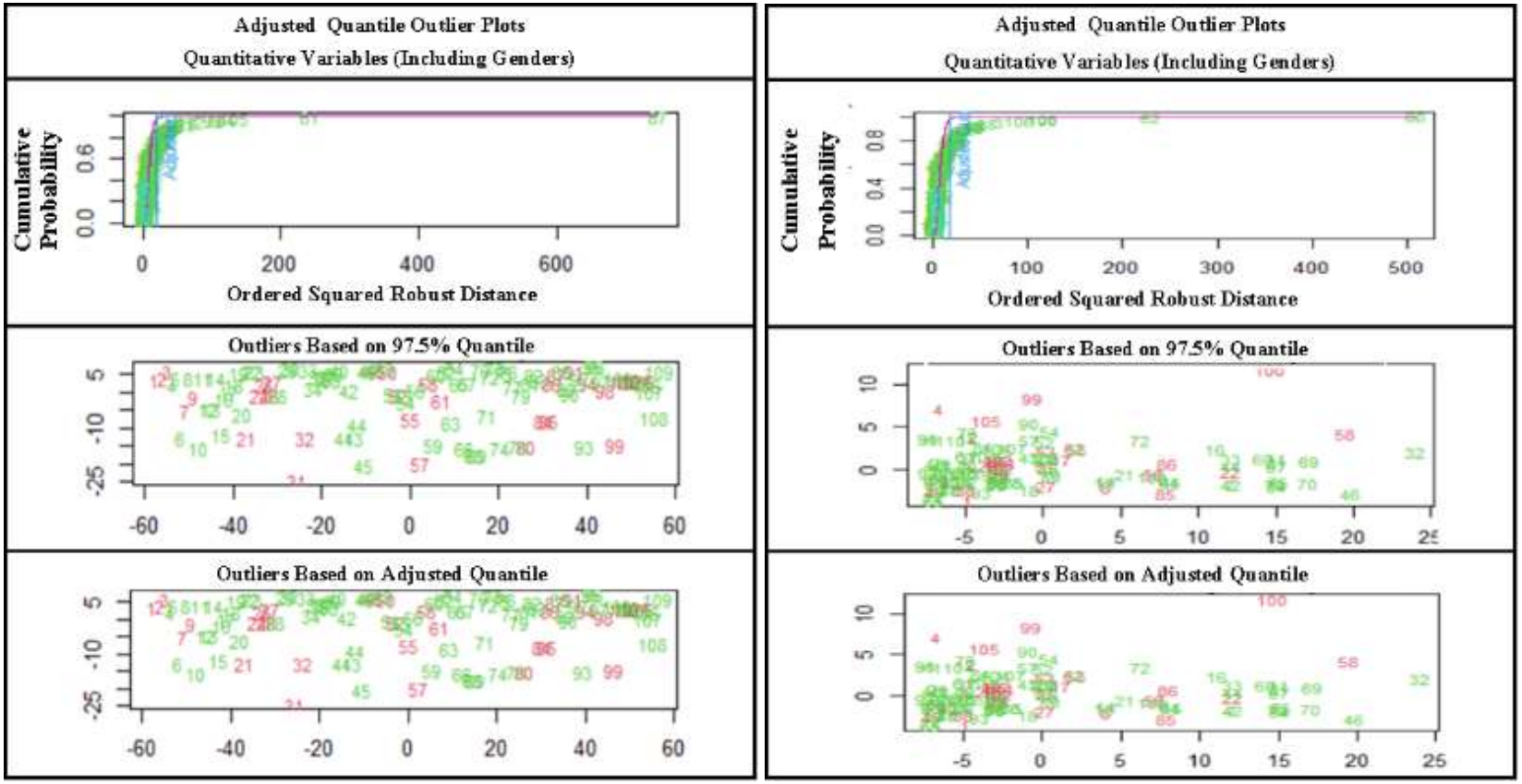

Figure I.2. Adjusted quantile plots of observations. Possible outliers marked in red. Produced using RStudio and the mvoutlier package (Filzmoser & Moritz, 2018; RStudio Team, 2020), and Microsoft Office Publisher.

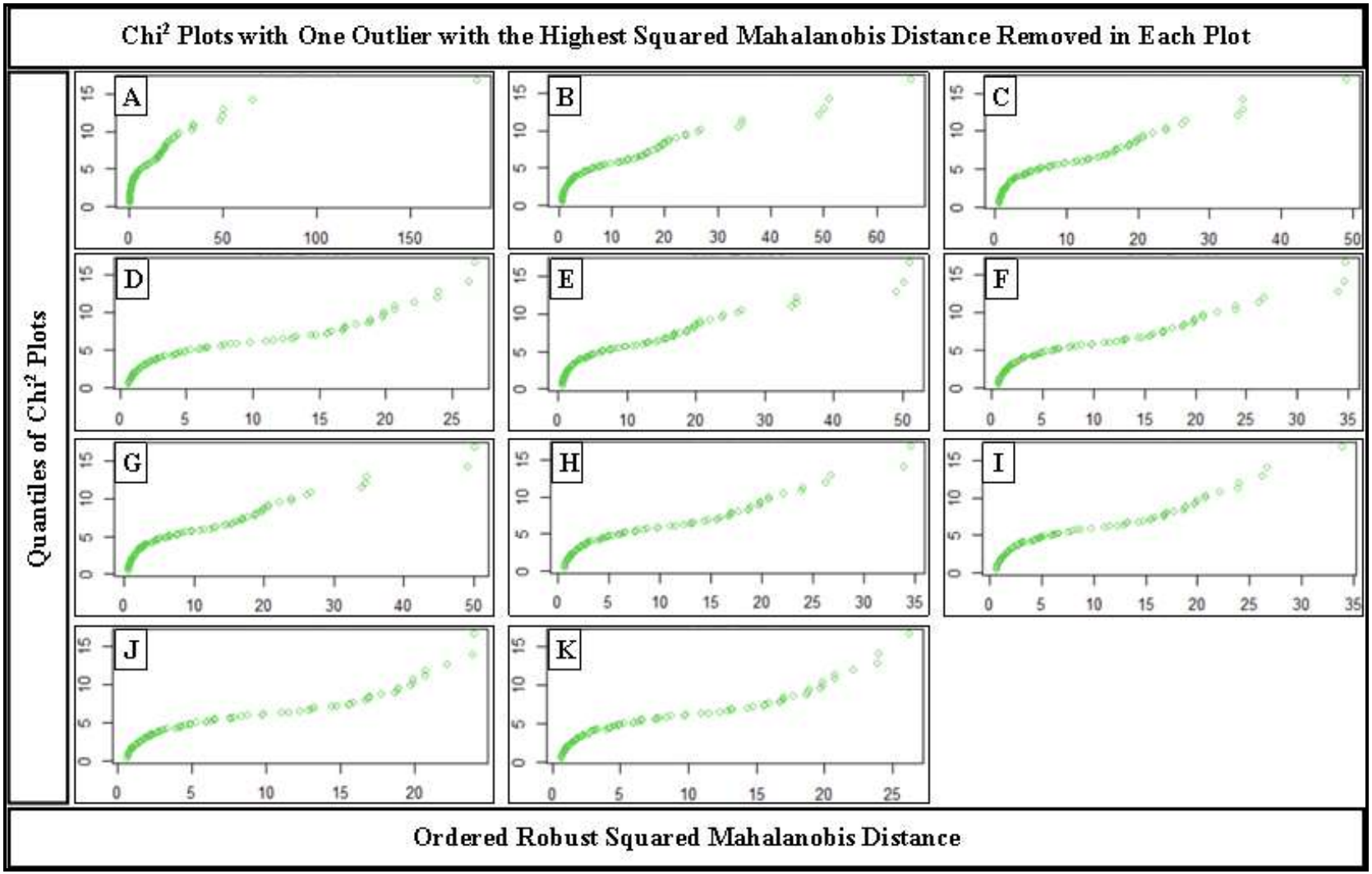

Figure I.3. Progression of chi square distributions while removing observations, one at a time, with the highest robust Mahalanobis distance. Shown for the household ages subset. Graph A represents no outliers excluded, and the remaining B—K show the progression of removing the first 10 common outliers. Produced using RStudio and the mvoutlier package (Filzmoser & Moritz, 2018; RStudio Team, 2020), and Microsoft Office Publisher.

Appendix J – Partial Least Squares Path Modeling Procedures

Wold (1982, 1985) developed partial least squares path modeling (PLS-PM). PLS-PM can act as an alternative to a structural equation modeling (SEM) (Garson, 2016; Romano & Palumbo, 2021; Samani, 2016; M. Tenenhaus, 2008; Vinzi, Chin, et al., 2010), which Alinovi et al. (2008) recommended for modeling resilience to food insecurity. The exploratory nature of the present study and non-normal mixed data led me to choose a multi-stage approach as Alinovi et al. (2008) did. My multistage approach culminated in PLS-PM, which is considered an alternative to SEM for non-normal data and small sample sizes, as was the case in this study (Crocetta et al., 2021; Romano & Palumbo, 2021; Vinzi, Chin, et al., 2010). Samani (2016) breaks-down well the differences between SEM and PLS-PM. Much like principal component analyses, PLS-PM is preferred "because latent variables are calculated as a weighted sum of their indicators," (Sanchez, 2013, p. 39) (Romano & Palumbo, 2021; Tubadji & Pelzel, 2015). I will not repeat the countless algorithms, studies, and perspectives on PLS-PM, which are extensive in the literature to date (Garson, 2016; Haenlein & Kaplan, 2004; Henseler et al., 2009; Henseler, 2018; McIntosh et al., 2014; Samani, 2016; G. Sanchez, 2013; A. Tenenhaus & Tenenhaus, 2010; Vinzi, Chin, et al., 2010; Vinzi & Russolillo, 2013).

A primary challenge of PLS-PM comes when choosing to specify a path model as reflective or formative (Garson, 2016). Debates and comparisons have existed in the literature for decades and continues about the best approaches for PLS-PM, whether to model reflectively or formatively (Crocetta et al., 2021; Diamantopoulos & Winklhofer, 2001; Fornell et al., 1991; Garson, 2016; Samani, 2016; Vinzi & Russolillo, 2013). In a reflective model, observations (manifest variables; MVs) represent the imperceivable notion (latent variables; LV); the LV gives rise to its MVs and if the LV changes, so too does its MVs (Addinsoft, 2021; Garson,

2016). Reflective models should depict high unidimensionality (i.e., inter-MV correlation) (Garson, 2016; Samani, 2016). If unidimensionality proves to not be the case, a researcher should consider whether a formative model is more appropriate, which can handle multidimensionality (Garson, 2016). In a formative model, the MVs constitute the LV; the LV emerges from its MVs and if one MV changes, so too should the LV (Addinsoft, 2021; Vinzi & Russolillo, 2013). Formative LVs have fewer goodness of fit indices, however, the XLSTAT software (Addinsoft, 2021) employed in this study provides communalities, which are a cross-validation metric recommended for smaller datasets (Crocetta et al., 2021). Formative LVs run the risk of data suppression, though this study is exploratory and therefore no causality is assumed within these models, meaning the risks of suppression or spurious effects were low (Garson, 2016).

Extensive evidence of model misspecifications exists throughout the literature, most commonly when formative models are misspecified as reflective, which occurred in the early stages of this study; this serves as an important reminder to carefully consider the theoretical underpinnings of the model (Garson, 2016). I spent extensive time considering the a priori theory that defined the latent agricultural food access. I considered each observed variable individually and how I originally theorized its relationship to the latent agricultural food access (AFA). This process led to a formative model on the basis that I conceptualized the paths originally to determine what observable aspects of agricultural food access in Bikotiba gave rise to the long theorized and well-studied latent construct, AFA, one theorized part of the also latent resilience to food insecurity. In specifying a PLS-PM, the a priori context and constitution of each MV must be the foundational reason for choosing whether to specify reflective or formative models (Garson, 2016; Samani, 2016). The vast literature on this debate has in my opinion only muddied

and complicated descriptions in literature, and therefore impeded research understanding of the true and critical differences between these two modes (Garson, 2016; Samani, 2016).

Like any statistical analysis, PLS-PM comes with assumptions and limitations. Unlike other ways of modeling latent variables, Garson (2016) notes that PLS-PM conforms robustly to classic statistical requirements it might violate, such as normality. “PLS-PM is robust against measurement error,” (Garson, 2016, p. 225) and can therefore handle binary categorical variables. PLS-PM is also insensitive to high multicollinearity, but perfect correlations should be excluded as redundant (Garson, 2016). While less robust than traditional SEM in general, PLS-PM is robust to small sample sizes (Garson, 2016), making it a compelling latent variable modeling tool. Literature has long prescribed the rule of 10 for PLS-PM sample sizes, recommending at least 10 times more observations than dimensions of manifest variables (Garson, 2016). While the rule of 10 is accepted widely for confirmatory studies, the rules could be more flexible for exploratory studies, though less than 10 observations per LV could produce misleading model quality outputs and performance. Therefore, one must be careful to draw conclusions if sample size is less than the rule of 10 (Garson, 2016), as in this study with 100 observations and 12 manifest variable dimensions.

In XLSTAT (Addinsoft, 2021), outputs of PLS-PM relevant to this formative model are presented including model specifications, composite reliability, variable-factor correlations, path weights and boot strap weights, and communalities (Table J.1). Due to the nature of the manifest variables and goals of the study, I specified a formative model (Table J.2) with standardized manifest variables, PLS regression, 100 bootstrap resamplings, 11 blindfolding steps, and no external deflation (Addinsoft, 2021; Dijkstra & Henseler, 2015; Lohmöller, 1989; G. Sanchez, 2013; Vinzi & Russolillo, 2013).

Table J.1. Descriptions of statistical outputs from PLS-PM in XLSTAT (Addinsoft, 2021) relevant to this one dimensional formative model.

Feature	Description
Specifications of the Measurement Model	Quantity of MVs per LV, the mode for each LV (A-Reflective or B-Formative), whether signs inverted, whether raw variables deflated, type of measurement mode (OLS or PLS), treatment of the manifest variables, initial weights, internal esitmation type, method (PLS, Centroid, or Structural), stop conditions and convergence, confidence intervals and resamplings, and treatment of latent variable score (Addinsoft, 2021).
Composite Reliability	A measurement of internal consistency that produces a critical eigenvalue and a list of the corresponding eigenvectors in decreasing order based on a principal component analysis (Addinsoft, 2021; Garson, 2016). For each LV, XLSTAT (Addinsoft, 2021) outputs the number of MV dimensions, the critical eigenvalue, and a list of the corresponding eigenvectors.
Variable/Factor Correlation	Produced from a principal component analysis and lists the correlation between the lower dimensional factors and each MV (Addinsoft, 2021).
Measurement Model Path Weights	Experts do not recommend excluding MVs based on low weights, but only due to multicollinearity (Sanchez, 2013). These outer weights ultimately contribute to creating LV scores, or "weighted scores of its manifest variables," that are particularly relevant in multidimensional structural models (Sanchez, 2013, p. 41)
Communalities	A type of validation. In one dimensional models, also called squared loadings, or the common variance between MVs and their LVs (Sanchez, 2013)
Bootstrap Weights	A type of validation. Vast differences between raw and bootstrap weights, or high bootstrap standard errors, should caution against inference (McIntosh et al., 2014).

Table J.2. Specifications of the partial least squares path model of agricultural food access (Addinsoft, 2021).

Feature	Specification
MV Treatment	Weights on standardized MVs
Initial Weights	Values of the first eigenvector
Internal Estimation	PLS
Regression	PLS
Method	PLS-PM
Consistent PLS	Yes
Stop Conditions	100 Iterations/Convergence = 0.0001
Confidence Interval	100 Bootstrap resamplings, with 95% confidence interval, and resampling size n=100
Model Quality	Blindfolding step 100
LV Scores	Standardized with auto-interpretation
Seed Number	Random
Mode	B (Reflective)
External Deflation	No
Invert Sign	No

Appendix K – Data Reduction Procedures

In this Appendix K, I first discuss data reduction in general, then summarize the three techniques used in this study, and finally I summarize my process of reducing data. Throughout this exploratory study, I conducted more than 140 variations of these three data reduction techniques to visualize patterns in the data based on the theorized unobservable (i.e., latent) agricultural food access (AFA), which led to the final partial least square path modeling decisions.

I must note that I used this reduction process to "exclude" observed variables that contributed least to patterns underlying AFA and thus eliminate unneeded noise before implementing PLS-PM. It is important to state that any variables "excluded" throughout the data reduction were not in fact excluded from the overall analysis. Every home, participant, and response provided invaluable insight to and context for any conclusions drawn in this study. The observed variables referenced as "excluded" in this Appendix and in the study merely represent those variables that proved statistically weak contributors. When combined with my knowledge of Bikotiba and a priori theory, I eliminated those "weaker" variables to maximize the ability to represent the data in a lower dimension.

Three data reduction techniques were used in this study based on the nature of manifest variables observed – principal component analyses (PCA), mixed principal component analyses (MPCA), and multiple correspondence analyses (MCA). The theories, theorems, algorithms, and limitations of these data reductions are already explained well for PCA (Filzmoser et al., 2018b; Härdle & Simar, 2015; Hotelling, 1933; R. Johnson & Wichern, 2019; Ringnér, 2008), MPCA (Chavent et al., 2012, 2014; Kiers, 1991; Saracco & Chavent, 2016), and MCA (Fithian & Josse, 2017; Greenacre & Blasius, 2006; Groenen & Koning, 2006; Husson & Josse, 2014; Kaciak & Louviere, 1990; Khangar & Kamalja, 2017; Le Roux & Rouanet, 2009). Therefore, in this

Appendix, I only summarize the three techniques, which I applied using the XLSTAT Applied Sensory software (Addinsoft, 2021).

The first data reduction technique I used was principal component analysis on groups of quantitative variables. PCA deconstructs the covariance matrix of observed variables to determine a linear, lower dimensional grouping of those variables that explain the greatest variance in the whole multivariate dataset (Härdle & Simar, 2015). Establishing the optimal number of these lower dimensional factors of observed variables creates a more reliable, quality depiction of a latent variable like AFA (Härdle & Simar, 2015). In XLSTAT (Addinsoft, 2021), PCA has many outputs that allowed me to determine the observed variables contributing least to the lower dimensional factors.

Five PCA outputs were critical to helping me reduce the data dimensions in this study, many of which are common to MPCA and MCA. First, a Spearman Rank correlation (Filzmoser et al., 2018a) chosen for the non-normal data matrix indicated statistically significant correlations between observed variables ($\alpha = 0.05$), making them appropriate for a formative partial least squares path model (Garson, 2016) as discussed in Appendix J. Second, eigenvalues indicate the degree of inertia supporting each factor, with the first factor representing the highest eigenvalue and the rest in descending order; first and second factors represent variation in the data well if the first eigenvalue is greater than one and the second value less than one (Härdle & Simar, 2015; Olive, 2017). The strength of an eigenvalue relates to the percentage of cumulative variability in the data explained by its associated factor, with each factor having an individual variability contribution (Härdle & Simar, 2015; Olive, 2017). Ideally, combining more factors would increasingly represent more of the cumulative variability in the data. Third, a scree plot (Cattell 1966) is the graphical representation of the eigenvalues and cumulative variability that

helped me to visualize the number of relevant factors to consider in further analysis. Fourth, information from the scree plot helps the researcher to choose a factor-cut off point, for which the percent contributions and squared cosines of each variable per factor should be strongest (Cattell, 1966). Observed variables with the highest contributions and squared cosines for factors past the factor cut-off point could be considered for exclusion to improve lower dimensions (Härdle & Simar, 2015). Fifth, a factor map of observations plotted for the first two factors (or factors of choice) can indicate potential observation anomalies (Saracco & Chavent, 2016).

I used all five of these PCA outputs in unison to determine opportunities to exclude those variables contributing least to quantitative grouping of household demographics, crops, and household finances. Additionally, despite opposition to the Kaiser-Meyer-Olkin (KMO) measure (Kaiser, 1974) to describe adequacy of a sample, due to its admitted subjectivity and claims that most of the 6,000 plus studies citing Kaiser (1974) do so incorrectly (Heiser & Hubert, 2016), I used it only loosely. Despite its frequent use by modern researchers and acceptance of Kaiser's (1974) assertion that KMO less than 0.50 represents inadequate data sampling, I evaluated the KMO output only insofar as expecting the results to increase with enhanced combinations of variables into factors, due to the subjectivity Kaiser's (1974) KMO scale.

I also used multiple correspondence analysis (MCA). Whereas PCA is applicable only to blocks of quantitative variables, MCA is applicable only to blocks of qualitative variables (Le Roux & Rouanet, 2009). MCA categorizes variables as coordinates on a matrix X as described in detail by Kaciak & Louviere (1990), Lombardo and Meulman (2010), and Purwandari et al. (2021). The variance of each MCA factor is expressed as inertia, or the variance described by each matrix coordinate (Lombardo & Meulman, 2010; Purwandari et al., 2021). Coordinates are mapped for variables and observations, with total inertia representing the quality of those maps

(Purwandari et al., 2021) or the quality of interactions between two or more variable categories (Lombardo & Meulman, 2010). Outputs for MCA are like PCA, with the same implications for eigenvalues, cumulative variability, scree plots, contributions, square cosines, and factor maps of observations.

The final data reduction technique employed in this study was mixed principal component analysis (MPCA), developed first by Hill and Smith (1976) and existing today as a statistical function developed by Chavent et al. (2014) for the R software as a combination of PCA and MCA. Addinsoft (2021) used Chavents et al.'s (2014) function to later develop the PCAmix function in XLSTAT. MPCA was the appropriate tool that I used for final analyses of AFA with mixed quantitative and qualitative variables. The same shared outputs of PCA and MCA were of note in these reductions: eigenvalues, cumulative variability, scree plot, square cosines, and factor map of observations. Three final MPCAs led me to exclude farm ownership and whether farmers grow fruits from the final model because doing so increased the cumulative variability that the first three underlying factors could together explain from 56.5% to 65% (Table K.1). Doing so also reduced the data to a number of manifest variable dimensions (12) that were more compatible with the sample size n=100.

Table K.1. Results of the final three mixed principal component analyses that led me to exclude farm ownership and whether the farmer grows fruit from the subsequent partial least squares path model. Squared cosines of each manifest variable (MV) are listed for each factor, with the highest square cosine of each MV highlighted in red. If the highest square cosine is outside the critical factors, the next highest figure within the critical factors is highlighted in yellow.

A. All considered manifest variables included. Farm ownership's highest squared cosine correlated to F5.
B. With the farm ownership MV excluded, the cumulative variability explained by F3 increased. Whether a farmer grows fruit was the MV with the greatest correlation outside the critical factors.
C. With the fruit MV excluded, cumulative variability increased and no MVs were any longer substantially more correlated with factors F4 or F5. Livestock was nearly equally correlated with F1 and F4 but was maintained in the subsequent model.

A. All MVs Included					
Eigenvalue	2.813	1.442	1.399	1.090	0.958
% Variability Explained	28.131	14.418	13.994	10.902	9.581
Cumulative % Variability Explained	28.131	42.549	56.543	67.444	77.025
MV	**F1**	**F2**	**F3**	F4	F5
Corn (ha)	**0.378**	0.109	0.243	0.025	0.028
Tubers (ha)	**0.373**	0.095	0.000	0.032	0.308
Other Grains (ha)	**0.260**	0.111	0.140	0.233	0.030
Farm Distance	0.278	**0.411**	0.008	0.108	0.052
Vegetables	0.210	0.058	**0.297**	0.157	0.061
Fruit	**0.272**	0.067	0.093	0.024	0.073
Livestock	**0.243**	0.064	0.124	0.321	0.002
Farm Workers	**0.269**	0.144	0.232	0.149	0.002
Sleep at Farm	**0.525**	0.151	0.038	0.041	0.060
Farm Ownership	0.006	**0.231**	**0.225**	0.000	**0.341**

B. Farm Ownership Excluded					
Eigenvalue	2.809	1.422	1.239	1.090	0.800
% Variability Explained	31.213	15.803	13.770	12.112	8.885
Cumulative % Variability Explained	31.213	47.016	60.786	72.898	81.783
MV	**F1**	**F2**	**F3**	F4	F5
Corn (ha)	**0.377**	0.316	0.054	0.023	0.015
Tubers (ha)	**0.372**	0.061	0.148	0.026	0.209
Other Grains (ha)	**0.269**	0.000	**0.269**	0.221	0.017
Farm Distance	0.269	0.198	**0.281**	0.117	0.001
Vegetables	0.211	**0.278**	0.114	0.166	0.001
Fruit	**0.280**	0.000	0.104	0.023	**0.548**
Livestock	**0.245**	0.180	0.003	**0.320**	0.004
Farm Workers	0.269	**0.354**	0.029	0.146	0.001
Sleep at Farm	**0.517**	0.034	0.237	0.047	0.003

C. Fruit Excluded					
Eigenvalue	2.579	1.411	1.222	1.080	0.560
% Variability Explained	32.241	17.633	15.274	13.496	7.003
Cumulative % Variability Explained	32.241	49.874	65.148	78.644	85.647
MV	**F1**	**F2**	**F3**	F4	F5
Corn (ha)	**0.350**	0.321	0.048	0.039	0.026
Tubers (ha)	**0.356**	0.051	0.267	0.075	0.098
Other Grains (ha)	**0.277**	0.009	**0.268**	0.215	0.140
Farm Distance	**0.319**	0.162	0.266	0.115	0.010
Vegetables	0.196	**0.309**	0.144	0.119	0.101
Livestock	**0.265**	0.189	0.015	**0.288**	0.149
Farm Workers	0.256	**0.343**	0.010	0.180	0.035
Sleep at Farm	**0.561**	0.026	0.203	0.047	0.000

Appendix L – Household Interview Descriptive Statistics

Variable	Code	Frequency per Category (%)
Grows Fruits	0 - No	40
	1 - Yes	60
Grows Vegetables	0 - No	27
	1 - Yes	73
Crop Pest Challenges	0 - No	8
	1 - Yes	92
Owns Farm	0 - No	12
	1 - Yes	88
Has a Job	0 - No	45
	1 - Yes	55
Live-In Farm Workers	0 - No	87
	1 - Yes	13
Sleeps at Farm	0 - No	52
	1 - Yes	48
Soil Change in Last Five Years	0 - No	9
	1 - Yes	91
Weather Change in Last Five Years	0 - No	1
	1 - Yes	99
Has Savings for Emergencies	0 - No	85
	1 - Yes	15
Keeps Livestock	0 - No	14
	1 - Yes	86
Agriculture Changes during Lifetime	0 - No	23
	1 - Yes	77
Practice Agriculture Different than Parents	0 - No	94
	1 - Yes	6
Owns Assets	Electricity	79
	TV	50
	DVD	39
	Fan	19
	Radio	60
	Phone	89
	Motorcycle	54
	Car	4
	Fridge	5
	Latrine	10
Disturbance Response - Crop Failure and Fertilizer Price Change	1 - Borrow money or goods	5
	2 - Buy (via job income or selling animals) or borrow money or goods	10
	3 - Attempt to borrow or suffer	14
	4 - Buy money or goods via job income or selling animals	7
	5 - Attempt to buy or suffer	16
	6 - Suffer	48

References

Abate, T., van Huis, A., & Ampofo, J. (2000). Pest management strategies in traditional agriculture: An African perspective. *Annual Review of Entomology*, *45*, 631–659. https://doi.org/10.1146/annurev.ento.45.1.631

Abdi, A. (2010). Globalization, culture and development: Perspectives on Africa. *Journal of Alternative Perspectives in the Social Sciences*, *2*, 1–25.

Abdi, A. A. (2007). Global Multiculturalism: Africa and the Recasting of the Philosophical and Epistemological Plateaus. *Diaspora, Indigenous, and Minority Education*, *1*(4), 251–264.

Adams, M., Carpenter, J., Housty, J., Neasloss, D., Paquet, P., Service, C., Walkus, J., & Darimont, C. (2014). Toward increased engagement between academic and indigenous community partners in ecological research. *Ecology & Society*, *19*(3), 49–58. https://doi.org/10.5751/ES-06569-190305

Adda, C., Borgemeister, C., Biliwa, A., Meikle, W., Markham, R., & Poehling, H. (2002). Integrated pest management in post-harvest maize: A case study from the Republic of Togo (West Africa). *Agriculture, Ecosystems & Environment*, *93*(1), 305–321. https://doi.org/10.1016/S0167-8809(01)00344-9

Addinsoft. (2021). *XLSTAT* (Version 2021.2) [Computer software]. Addinsoft. https://www.xlstat.com/en/

Agula, C., Akudugu, M., Dittoh, S., & Mabe, F. (2018). Promoting sustainable agriculture in Africa through ecosystem-based farm management practices: Evidence from Ghana. *Agriculture & Food Security*, *7*(1), 5. https://doi.org/10.1186/s40066-018-0157-5

Ahmed, K., Wang, G., Yu, M., Koo, J., & You, L. (2015). Potential impact of climate change on cereal crop yield in West Africa. *Climatic Change: An Interdisciplinary, International*

Journal Devoted to the Description, Causes and Implications of Climatic Change, *133*(2), 321–334. https://doi.org/10.1007/s10584-015-1462-7

Akindele, S., Gidado, T., & Olaopa, O. (2001). Globalization, its implications and consequences for Africa. *Journal of Social Sciences*, *5*(4), 221–230. https://doi.org/10.1080/09718923.2001.11892309

Akombi, B., Agho, K., Merom, D., Renzaho, A., & Hall, J. (2017). Child malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys (2006-2016). *PLOS ONE*, *12*(5). https://doi.org/10.1371/journal.pone.0177338

Ali, E. (2017). A review of agricultural policies in independent Togo (1960-2015). *International Journal of Agricultural Policy and Research*, *5*(5), 104–116. https://doi.org/10.15739/IJAPR.17.012

Alinovi, L., Mane, E., & Romano, D. (2008). Towards the measurement of household resilience to food insecurity: Applying a model to Palestinian household data. In R. Sibrian (Ed.), *Deriving food security information from national household budget surveys: Experiences, achievements, and challenges* (pp. 137–152). United Nations Food & Agriculture Organization. http://www.fao.org/3/i0430e/i0430e00.htm

Alinovi, L., Mane, E., & Romano, D. (2010). Measuring household resilience to food insecurity: Application to Palestinian households. In R. Benedetti, M. Bee, G. Espa, & F. Piersimoni (Eds.), *Agricultural Survey Methods* (pp. 341–368). Wiley Online Library. https://doi.org/10.1002/9780470665480.ch21

Allen, P., Maguire, S., & McKelvey, B. (2011). *The SAGE handbook of complexity and management*. SAGE.

Altieri, M. (2002). Agroecology: The science of natural resource management for poor farmers in marginal environments. *Agriculture, Ecosystems & Environment*, *93*(1–3), 1–24. https://doi.org/10.1016/S0167-8809(02)00085-3

Altieri, M. (2004). Linking ecologists and traditional farmers in the search for sustainable agriculture. *Frontiers in Ecology and the Environment*, *2*(1), 35–42. https://doi.org/10.2307/3868293

Altieri, M., Funes-Monzote, F., & Petersen, P. (2011). Agroecologically efficient agricultural systems for smallholder farmers: Contributions to food sovereignty. *Agronomy for Sustainable Development*, *32*(1), 1–13. https://doi.org/10.1007/s13593-011-0065-6

Amekawa, Y. (2011). Agroecology and sustainable livelihoods: Towards an integrated approach to rural development. *Journal of Sustainable Agriculture*, *35*(2), 118–162. https://doi.org/10.1080/10440046.2011.539124

Antwi, E., Mensah, R., Attua, E., Yiran, G., Boakye-Danquah, J., Ametepe, R., & Boadi, D. (2018). Assessing land and ecosystem management at the local level in the savannah ecological zone and the implications for sustainability. In *Strategies for Building Resilience against Climate and Ecosystem Changes in Sub-Saharan Africa* (pp. 149–177). Springer.

Anyonge, T., Holding, C., Kareko, K., & Kimani, J. (2001). Scaling up participatory agroforestry extension in Kenya: From pilot projects to extension policy. *Development in Practice*, *11*(4), 449–459. https://doi.org/10.1080/09614520120066738

Asiedu, N. (2019). Rethinking Cultural Ecofeminism in the Commercial Transport and Storage System in Ghana: A Critique of “Women Moving the City” and “Women Moving

Trucks" Projects. *The History of Land Transport*, *5*(1). https://doi.org/10.13187/hlt.2019.1.3

Asongu, S. (2013). Globalization and Africa: Implications for human development. *International Journal of Development Issues*, *12*(3), 213–238. https://doi.org/10.1108/IJDI-10-2012-0064

Atalay, S. (2012). *Community-Based Archaeology: Research with, by, and for Indigenous and Local Communities*. Berkeley: University of California Press. https://www.ucpress.edu/book/9780520273368/community-based-archaeology

Auerbach, R., Rundgren, G., & El-Hage Scialabba, N. (Eds.). (2013). *Organic Agriculture African Experiences in Resilience and Sustainability*. United Nations Food & Agriculture Organization. http://www.fao.org/3/i3294e/i3294e.pdf

Baiphethi, M. N., & Jacobs, P. (2009). The contribution of subsistence farming to food security in South Africa. *Agrekon*, *48*(4), 459–482. https://doi.org/10.1080/03031853.2009.9523836

Battiste, M. (2008). Research ethics for protecting Indigenous knowledge and heritage: Institutional and researcher responsibilities. In N. Denzin, Y. Lincoln, & L. Smith (Eds.), *Handbook of critical and indigenous methodologies* (pp. 497–510). SAGE Publications, Inc. https://dx.doi.org/10.4135/9781483385686.n25

Baudron, F., & Giller, K. (2014). Agriculture and nature: Trouble and strife? *Biological Conservation*, *170*, 232–245. https://doi.org/10.1016/j.biocon.2013.12.009

Béné, C., Headey, D., Haddad, L., & von Grebmer, K. (2016). Is resilience a useful concept in the context of food security and nutrition programmes? Some conceptual and practical considerations. *Food Security: The Science, Sociology and Economics of Food*

Production and Access to Food, *8*(1), 123–138. https://doi.org/10.1007/s12571-015-0526-x

Benitez, J., Henseler, J., Castillo, A., & Schuberth, F. (2020). How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. *Information & Management*, *57*(2), 1–16. https://doi.org/10.1016/j.im.2019.05.003

Bennett, M., Blackstock, C., & Centre of Excellence for Child Welfare. (2002). *First nations child and family services and indigenous knowledge as a framework for research, policy and practice*. Centre of Excellence for Child Welfare. https://scholars.wlu.ca/cgi/viewcontent.cgi?article=1013&context=pcfp

Berkes, F. (2004). Rethinking community-based conservation. *Conservation Biology*, *18*(3), 621–630. https://doi.org/10.1111/j.1523-1739.2004.00077.x

Berkes, F. (2007a). Community-based conservation in a globalized world. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(39), 15188–15193. https://www.jstor.org/stable/25449111

Berkes, F. (2007b). Understanding uncertainty and reducing vulnerability: Lessons from resilience thinking. *Natural Hazards*, *41*(2), 283–295. https://doi.org/10.1007/s11069-006-9036-7

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications*, *10*(5), 1251–1262. https://doi.org/10.2307/2641280

Bizikova, L., Roy, D., Venema, H., McCandless, M., Swanson, D., Khachtryan, A., Borden, C., Zubrycki, K., & International Institute for Sustainable Development. (2014). *Water-*

energy-food nexus and agricultural investment: A sustainable development guidebook (Vol. 1). International Institute for Sustainable Development. https://www.deslibris.ca/ID/242258

Bizikova, L., Tyler, S., Moench, M., Keller, M., & Echeverria, D. (2016). Climate resilience and food security in Central America: A practical framework. *Climate and Development*, *8*(5), 397–412. https://doi.org/10.1080/17565529.2015.1064806

Björklund, J., Araya, H., Edwards, S., Goncalves, A., Höök, K., Lundberg, J., & Medina, C. (2012). Ecosystem-based agriculture combining production and conservation—A viable way to feed the world in the long term? *Journal of Sustainable Agriculture*, *36*(7), 824–855. https://doi.org/10.1080/10440046.2012.705813

Bjornlund, V., Bjornlund, H., & Van Rooyen, A. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective. *International Journal of Water Resources Development*, *36*(sup1), S20–S53. https://doi.org/10.1080/07900627.2020.1739512

Bond, P. (2006). *Looting Africa: The economics of exploitation* (Vol. 1). University of KwaZulu-Natal Press. http://whel-primo.hosted.exlibrisgroup.com/openurl/44WHELF_NLW/44WHELF_NLW_services_page?u.ignore_date_coverage=true&rft.mms_id=99942058902419

Bonfoh, B., Todje, A., & Gbakenou, K. (2016). *Status of agricultural innovations, innovation platforms, and innovations investment- 2015 PARI project country report: Republic of Togo*. Forum for Agricultural Research in Africa (FARA). https://research4agrinnovation.org/wp-content/uploads/2017/01/Togo_InnovationStudy.pdf

Boon, S., Butler, L., & Jefferies, D. (2018a). Hauntings: Love. In S. Boon, L. Butler, & D. Jefferies (Eds.), *Autoethnography and Feminist Theory at the Water's Edge: Unsettled Islands* (pp. 25–28). Springer International Publishing. https://doi.org/10.1007/978-3-319-90829-8_3

Boon, S., Butler, L., & Jefferies, D. (2018b). Land: Landscape. In S. Boon, L. Butler, & D. Jefferies (Eds.), *Autoethnography and Feminist Theory at the Water's Edge: Unsettled Islands* (pp. 51–57). Springer International Publishing. https://doi.org/10.1007/978-3-319-90829-8_7

Boukary, A., Diaw, A., & Wuenscher, T. (2016). Factors affecting rural households' resilience to food insecurity in Niger. *Sustainability*, *8*(3), 181. https://doi.org/10.3390/su8030181

Bradley, B., Estes, L., Hole, D., Holness, S., Oppenheimer, M., Turner, W., Beukes, H., Schulze, R., Tadross, M., & Wilcove, D. (2012). Predicting how adaptation to climate change could affect ecological conservation: Secondary impacts of shifting agricultural suitability. *Diversity & Distributions*, *18*(5), 425–437. https://doi.org/10.1111/j.1472-4642.2011.00875.x

Bradshaw, C., Sodhi, N., & Brook, B. (2009). Tropical turmoil: A biodiversity tragedy in progress. *Frontiers in Ecology and the Environment*, *7*(2), 79–87. https://doi.org/10.1890/070193

Brown, L., & Strega, S. (2005). *Research as resistance: Critical, indigenous and anti-oppressive approaches*. Canadian Scholars' Press. https://www.deslibris.ca/ID/412464

Bry, X., Trottier, C., Mortier, F., Cornu, G., & Verron, T. (2016). Supervised component generalized linear regression with multiple explanatory blocks: THEME-SCGLR. In H. Abdi, V. Vinzi, G. Russolillo, G. Saporta, & L. Trinchera (Eds.), *The Multiple Facets of*

Partial Least Squares and Related Methods (pp. 141–154). Springer International Publishing. https://doi.org/10.1007/978-3-319-40643-5_11

Cabana, E., Lillo, R., & Laniado, H. (2019). Multivariate outlier detection based on a robust Mahalanobis distance with shrinkage estimators. *Statistical Papers*, *62*, 1583–1609. https://doi.org/10.1007/s00362-019-01148-1

Cabell, J., & Oelofse, M. (2012). An indicator framework for assessing agroecosystem resilience. *Ecology & Society*, *17*(1), 410–422. https://doi.org/10.5751/ES-04666-170118

Campbell, R., & Wasco, S. (2000). Feminist approaches to social science: Epistemological and methodological tenets. *American Journal of Community Psychology*, *28*(6), 773–791. https://doi.org/10.1023/A:1005159716099

Cattell, R. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*(2), 245–276. https://doi.org/10.1207/s15327906mbr0102_10

Chambers, D. N. (2019). Africa. In T. R. Zolnikov (Ed.), *Global Adaptation and Resilience to Climate Change* (pp. 11–29). Springer International Publishing. https://doi.org/10.1007/978-3-030-01213-7_2

Chamdimba, O., Ortmann, G., & Wale, E. (2021). Resilience to shocks and food insecurity: Determinants, and the impact of smallholder jatropha curcas cultivation in Southern Malawi. *African Journal of Science, Technology, Innovation and Development*, *13*(5), 619–633.

Chavent, M., Kuentz-Simonet, V., Labenne, A., & Saracco, J. (2014). *Multivariate analysis of mixed data: The R package PCAmixdata* (ArVix: 1411.4911 Stat) [CRAN; R]. http://arxiv.org/abs/1411.4911

Chavent, M., Kuentz-Simonet, V., Saracco, J., & SpringerLink (Online service). (2012). Orthogonal rotation in PCAMIX. *Advances in Data Analysis and Classification*, *6*, 131–146. https://doi.org/10.1007/s11634-012-0105-3

Cherniwchan, J., & Moreno-Cruz, J. (2019). Maize and precolonial Africa. *Journal of Development Economics*, *136*, 137–150. https://doi.org/10.1016/j.jdeveco.2018.10.008

Chilisa, B. (2012). *Indigenous research methodologies*. SAGE Publications, Inc.

Chilmeran, Y., & Hedström, J. (2021). Reflexivity and fieldwork in feminist peace research. In O. Richmond & G. Visoka (Eds.), *The Palgrave Encyclopedia of Peace and Conflict Studies*. Försvarshögskolan, Strategiavdelningen. http://urn.kb.se/resolve?urn=urn:nbn:se:fhs:diva-9705

Chimakonam, J., Agu, S., & Agbo, J. (2014). The nemesis of individualistic ontology in globalization and the practice of liberal democracy in post-colonial Africa. *Journal of Pan African Studies*, *7*(4), 137–155. https://www.researchgate.net/publication/280092841

Chin, W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly*, *22*(1), vii–xvi. https://doi.org/jstor.org/stable/249674

Chuwa, L. (2014). Introduction: The Culture of Ubuntu. In L. Chuwa (Ed.), *African Indigenous Ethics in Global Bioethics: Interpreting Ubuntu* (pp. 1–32). Springer Netherlands. https://doi.org/10.1007/978-94-017-8625-6_1

Ciofalo, N. (2019). Indigenous psychologies: A contestation for epistemic justice. In N. Ciofalo (Ed.), *Indigenous Psychologies in an Era of Decolonization* (pp. 1–38). Springer International Publishing. https://doi.org/10.1007/978-3-030-04822-8_1

Craven, C., & Davis, D.-A. (2013). *Feminist activist ethnography: Counterpoints to neoliberalism in North America*. Lexington Books.

Crocetta, C., Antonucci, L., Cataldo, R., Galasso, R., Grassia, M., Lauro, C., & Marino, M. (2021). Higher-order PLS-PM approach for different types of constructs. *Social Indicators Research*, *154*(2), 725–754. https://doi.org/10.1007/s11205-020-02563-w

Crothers, C. (2014). Decolonizing methodologies: Research and Indigenous Peoples. *Ethnic and Racial Studies*, *37*(5), 878–880. https://doi.org/10.1080/01419870.2013.800575

Cullen-Unsworth, L., Hill, R., Butler, J., & Wallace, M. (2012). A research process for integrating Indigenous and scientific knowledge in cultural landscapes: Principles and determinants of success in the Wet Tropics World Heritage Area, Australia. *The Geographical Journal*, *178*(4), 351–365. https://doi.org/10.1111/j.1475-4959.2011.00451.x

Cumming, G. (2014). Theoretical frameworks for the analysis of social–ecological systems. In S. Sakai & C. Umetsu (Eds.), *Social-ecological systems in transition* (pp. 3–24). Springer Japan. https://doi.org/10.1007/978-4-431-54910-9_1

Currency Converter—Foreign Exchange Rates Calculator | Xe. (n.d.). Retrieved June 10, 2021, from https://www.xe.com/currencyconverter/

Curtin, C., & Parker, J. (2014). Foundations of resilience thinking. *Conservation Biology*, *28*(4), 912–923. https://doi.org/10.1111/cobi.12321

Dahlquist, R., Whelan, M., Winowiecki, L., Polidoro, B., Candela, S., Harvey, C., Wulfhorst, J., McDaniel, P., & Bosque-Pérez, N. (2007). Incorporating livelihoods in biodiversity conservation: A case study of cacao agroforestry systems in Talamanca, Costa Rica. *Biodiversity and Conservation*, *16*(8), 2311–2333. https://doi.org/10.1007/s10531-007-9192-4

Danso, I., Gaiser, T., Webber, H., Naab, J., & Ewert, F. (2018). Response of maize to different nitrogen application rates and tillage practices under two slope positions in the face of current climate variability in the Sudan savanna of West Africa. In O. Saito, G. Kranjac-Berisavljevic, K. Takeuchi, & E. Gyasi (Eds.), *Strategies for building resilience against climate and ecosystem changes in sub-Saharan Africa* (pp. 41–58). Springer. https://doi.org/10.1007/978-981-10-4796-1_3

Darnhofer, I., Bellon, S., Dedieu, B., & Milestad, R. (2011). Adaptiveness to enhance the sustainability of farming systems. In E. Lichtfouse, M. Hamelin, M. Navarrete, & P. Debaeke (Eds.), *Sustainable agriculture* (Vol. 2, pp. 45–58). Springer Netherlands. https://doi.org/10.1007/978-94-007-0394-0_4

Datta, R. (2018). Decolonizing both researcher and research and its effectiveness in Indigenous research. *Research Ethics*, *14*(2), 1–24. https://doi.org/10.1177/1747016117733296

Datta, R., Khyang, N., Khyang, H. A., Khyang, M., Chapola, J., & Khyang, H. K. (2015). Participatory action research and researcher's responsibilities: An experience with an Indigenous community. *International Journal of Social Research Methodology*, *18*(6), 581–599. https://doi.org/10.1080/13645579.2014.927492

Defrance, D., Sultan, B., Castets, M., Famien, A., & Baron, C. (2020). Impact of Climate Change in West Africa on Cereal Production Per Capita in 2050. *Sustainability*, *12*(7585), 7585. https://doi.org/10.3390/su12187585

Denzin, N., Lincoln, Y., & Smith, L. (2008). *Handbook of critical and indigenous methodologies*. SAGE Publications, Inc. https://doi.org/10.4135/9781483385686

D'Errico, M., Pietrelli, R., & SpringerLink (Online service). (2017). Resilience and child malnutrition in Mali. *Food Security*, *9*, 355–370. https://doi.org/10.1007/s12571-017-0652-8

Diamantopoulos, A., & Winklhofer, H. (2001). Index construction with formative Indicators: An alternative to scale development. *Journal of Marketing Research*, *38*(2), 269–277. https://doi.org/10.1509/jmkr.38.2.269.18845

Díaz-José, J., Rendón, R., Govaerts, B., Jorge, A., & Rodríguez, M. (2015). Innovation diffusion in conservation agriculture: A network approach. *European Journal of Development Research*, *28*, 314–329. https://doi.org/doi.org/10.1057/ejdr.2015.9

Dijkstra, T., & Henseler, J. (2015). Consistent and asymptotically normal PLS estimators for linear structural equations. *Computational Statistics & Data Analysis*, *81*(1), 10–23.

Djabatey, R. L. (1993). *Agro-climatic hazards and the political economy of food insecurity in West Africa: A case of a rural food economy* [M.A., Wilfrid Laurier University (Canada)].

Doucet, A., & Mauthner, N. (2008). Qualitative interviewing and feminist research. In P. Alasuutari, L. Bickman, & J. Brannen (Eds.), *The SAGE handbook of social research methods*. SAGE Publications, Inc. https://dx.doi.org/10.4135/9781446212165

Dunbar, C. (2008). Critical race theory and indigenous methodologies. In N. Denzin, Y. Lincoln, & L. Smith (Eds.), *Handbook of critical and indigenous methodologies* (pp. 85–100). SAGE Publications, Inc. https://doi.org/10.4135/9781483385686.n5

Duruigbo, C., Ibeawuchi, I., Aja, O., & Ejiogu-Okereke, E. (2012). Indigenous technologies for adaptation and mitigation of climate change in Sub-Saharan Africa. *International Journal of Agriculture and Rural Development*, *14*(2), 630–637.

Dzanku, F., Jirström, M., & Marstorp, H. (2015). Yield Gap-Based Poverty Gaps in Rural Sub-Saharan Africa. *World Development*, *67*, 336–362. https://doi.org/10.1016/j.worlddev.2014.10.030

Ebert, A. (2014). Potential of underutilized traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems. *Sustainability*, *6*(1), 319–335. https://doi.org/10.3390/su6010319

ECOWAS. (2005). *Regional agricultural policy for West Africa: ECOWAP* (p. 12) [Policy]. Economic Community of West African States. https://www.diplomatie.gouv.fr/IMG/pdf/01_ANG-ComCEDEAO.pdf

Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *The Qualitative Report*, *23*(11), 2850–2861. https://doi.org/10.46743/2160-3715/2018.3560

Encyclopedia Britannica. (n.d.). Bassar | Togo. In *Encyclopedia Britannica*. Retrieved April 22, 2017, from https://www.britannica.com/place/Bassar

Ericksen, P., Ingram, J., & Liverman, D. (2009). Food security and global environmental change: Emerging challenges. *Environmental Science & Policy*, *12*(4), 373–377. https://doi.org/10.1016/j.envsci.2009.04.007

Ezeanya-Esiobu, C. (2019). *Indigenous knowledge and education in Africa*. Springer Singapore. https://doi.org/10.1007/978-981-13-6635-2

Fagbemissi, R. (2010). *Experts from necessity: Agricultural knowledge of children orphaned by AIDS in the Couffo region, Benin* [Doctoral Dissertation, Wageningen University]. https://research.wur.nl/en/publications/experts-from-necessity-agricultural-knowledge-of-children-orphane

FAO. (2004). *Voluntary guidelines to support the progressive realization of the right to adequate food in the context of national food security, adopted by the 127th Session of the FAO Council*. Food and Agriculture Organization of the United Nations. http://www.fao.org/3/y7937e/y7937e.pdf

Featherstone, D. (2012). *Solidarity: Hidden histories and geographies of internationalism*. Zed Books.

Feit, H. (2019). *Indigenous partnerships in knowledge and northern social research.* Canadian Polar Commission. http://hdl.handle.net/11375/23934

Filzmoser, P., Hron, K., & Templ, M. (2018a). *Applied compositional data analysis: With worked examples in R*. Springer. https://doi.org/10.1007%2F978-3-319-96422-5

Filzmoser, P., Hron, K., & Templ, M. (2018b). Principal component analysis. In P. Filzmoser, K. Hron, & M. Templ (Eds.), *Applied compositional data analysis: With worked examples in R* (pp. 131–148). Springer International Publishing. https://doi.org/10.1007/978-3-319-96422-5_7

Filzmoser, P., & Moritz, G. (2018). *Multivariate outlier detection based on robust methods: Mvoutlier package* (Version 2.0.9) [CRAN; RStudio]. https://cran.r-project.org/web/packages/mvoutlier/index.html

Fithian, W., & Josse, J. (2017). Multiple correspondence analysis and the multilogit bilinear model. *Journal of Multivariate Analysis*, *157*, 87–102. https://doi.org/10.1016/j.jmva.2017.02.009

Fitzpatrick, E., Martiniuk, A., D'Antoine, H., Oscar, J., Carter, M., & Elliott, E. (2016). Seeking consent for research with indigenous communities: A systematic review. *BMC Medical Ethics*, *17*(65), 1–18. https://doi.org/10.1186/s12910-016-0139-8

FNDI. (2013). *Reclaiming Native food systems: Part I*. First Nations Development Institute.

Folega, F., Woegan, Y. A., Marra, D., Wala, K., Batawila, K., Seburanga, J., Zhang, C., Peng, D., Zhao, X., & Akpagana, K. (2015). Long term evaluation of green vegetation cover dynamic in the Atacora Mountain chain (Togo) and its relation to carbon sequestration in West Africa. *Journal of Mountain Science*, *12*(4), 921–934. https://doi.org/10.1007/s11629-013-2973-1

Folke, C. (2006). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change*, *16*(3), 253–267. https://doi.org/10.1016/j.gloenvcha.2006.04.002

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience thinking: Integrating resilience, adaptability and transformability. *Ecology & Society*, *15*(4), 1–9. https://doi.org/10.5751/ES-03610-150420

Fonjong, L., & Gyapong, A. (2021). Plantations, women, and food security in Africa: Interrogating the investment pathway towards zero hunger in Cameroon and Ghana. *World Development*, *138*, 1–11. https://doi.org/10.1016/j.worlddev.2020.105293

Foran, T., Butler, J., Williams, L., Wanjura, W., Hall, A., Carter, L., & Carberry, P. (2014). Taking complexity in food systems seriously: An interdisciplinary analysis. *World Development*, *61*, 85–101. https://doi.org/10.1016/j.worlddev.2014.03.023

Fornell, C., Rhee, B.-D., & Yi, Y. (1991). Direct regression, reverse regression, and covariance structure analysis. *Marketing Letters*, *2*(3), 309–320. https://doi.org/10.1007/BF02404080

Fortier, C. (2017). Unsettling Methodologies/Decolonizing Movements. *Journal of Indigenous Social Development*, *6*(1), 20–36. https://journalhosting.ucalgary.ca/index.php/jisd/article/view/58461/43967

Franzel, S., Denning, G., Lillesø, J., & Mercado, A. (2004). Scaling up the impact of agroforestry: Lessons from three sites in Africa and Asia. *Agroforestry Systems: An International Journal Incorporating Agroforestry Forum*, *61–62*(1–3), 329–344. https://doi.org/10.1023/B:AGFO.0000029008.71743.2d

FTF. (n.d.). *2020 Feed the Future Progress Snapshot*. Feed the Future. Retrieved July 20, 2021, from https://www.feedthefuture.gov/cultivating-hope/

Garson, G. (2016). *Partial least squares: Regression and structural equation models*. Statistical Associates Publishers. http://www.statisticalassociates.com/pls-sem.htm

George, T. (2014). Why crop yields in developing countries have not kept pace with advances in agronomy. *Global Food Security*, *3*(1), 49–58. https://doi.org/10.1016/j.gfs.2013.10.002

GNR. (n.d.). *Country Nutrition Profiles*. Retrieved October 13, 2021, from https://globalnutritionreport.org/resources/nutrition-profiles/africa/western-africa/

Gone, J. (2018). Considering indigenous research methodologies: Critical reflections by an indigenous knower. *Qualitative Inquiry*, *25*(1), 45–56. https://doi.org/10.1177/1077800418787545

Grace, K., Lerner, A., Mikal, J., & Sangli, G. (2017). A qualitative investigation of childbearing and seasonal hunger in peri-urban Ouagadougou, Burkina Faso. *Population and Environment : A Journal of Interdisciplinary Studies*, *38*(4), 369–380. https://doi.org/10.1007/s11111-016-0268-5

Green, J. (2007). *Making space for indigenous feminism*. Fernwood Pub.

Greenacre, M., & Blasius, J. (2006). *Multiple correspondence analysis and related methods*. Chapman & Hall/CRC.

Groenen, P., & Koning, A. (2006). A new model for visualizing interactions in analysis of variance. In M. Greenacre & J. Blasius (Eds.), *Multiple correspondence analysis and related methods* (pp. 487–502). Chapman and Hall/CRC. https://doi.org/10.1201/9781420011319-25

Gruber, J. (2020). *Building community: Twelve principles for a healthy future*. New Society Publishers. https://ebookcentral-proquest-com.antioch.idm.oclc.org/lib/antiochne-ebooks/detail.action?docID=5820161

Guerin, B. (2000). Review of decolonizing methodologies: Research and indigenous peoples [Review of *Review of decolonizing methodologies: Research and indigenous peoples*, by L. Smith]. *The Journal of the Polynesian Society*, *109*(4), 439–440. http://www.jstor.org/stable/20706963

Gurtoo, A., & Williams, C. (2015). *Developing country perspectives on public service delivery*. Springer. https://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=2094118

Guyu, D., & Muluneh, W.-T. (2015). Wild foods (plants and animals) in the green famine belt of Ethiopia: Do they contribute to household resilience to seasonal food insecurity? *Forest Ecosystems*, *2*(34), 1–12. https://doi.org/10.1186/s40663-015-0058-z

Gyapong, A. (2021). Land grabs, farmworkers, and rural livelihoods in West Africa: Some silences in the food sovereignty discourse. *Globalizations*, *18*(3), 339–354. https://doi.org/10.1080/14747731.2020.1716922

GYGA. (n.d.). *Yield gap viewer*. Yield Gap Cap Atlas. Retrieved October 14, 2021, from https://www.yieldgap.org/gygaviewer/index.html

Haenlein, M., & Kaplan, A. (2004). A beginner's guide to partial least squares analysis. *Understanding Statistics*, *3*, 283–297. https://doi.org/10.1207/s15328031us0304_4

Härdle, W., & Simar, L. (2015). *Applied multivariate statistical analysis*. Springer. https://doi.org/10.1007/978-3-662-45171-7

HCP. (2020). *Togo Human Capital Index 2020*. The World Bank Human Capital Project. https://databank.worldbank.org/data/download/hci/HCI_2pager_TGO.pdf?cid=GGH_e_hcpexternal_en_ext

Heiser, W., & Hubert, L. (2016, July). *Comments by Larry Hubert & Willem Heiser on Kaiser (1974)* [Conference Presentation]. Psychometrika IMPS 2016. https://www.psychometricsociety.org/imps-2016

Hendrickson, M. (2015). Resilience in a concentrated and consolidated food system. *Journal of Environmental Studies and Sciences*, *5*(3), 418–431. https://doi.org/10.1007/s13412-015-0292-2

Henseler, J. (2018). Partial least squares path modeling: Quo vadis? *Quality & Quantity*, *52*(1), 1–8. https://doi.org/10.1007/s11135-018-0689-6

Henseler, J., & Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In V. Vinzi, W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares: Concepts, methods and applications* (pp. 713–735). Springer. https://doi.org/10.1007/978-3-540-32827-8_31

Henseler, J., Ringle, C., & Sinkovics, R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, *20*, 277–319. https://doi.org/10.1108/S1474-7979(2009)0000020014

Herrmann, S., Brandt, M., Rasmussen, K., & Fensholt, R. (2020). Accelerating land cover change in West Africa over four decades as population pressure increased. *Communications Earth & Environment*, *1*(1), 1–10. https://doi.org/10.1038/s43247-020-00053-y

Hesse-Bibber, S., & Piatelli, D. (2012). The feminist practice of holistic reflexivity. In S. Hesse-Bibber (Ed.), *Handbook of feminist research: Theory and praxis* (pp. 557–582). SAGE Publications, Inc. https://methods.sagepub.com/book/handbook-of-feminist-research/n27.xml

Hickerson, C., & Adriana. (2018). *Decolonial narrative techniques in healing novels from Shaugawaumikong, Walatowa, Kawaika, Chimputi, and Calotmul* [Published doctoral dissertation, UC Irvine]. https://escholarship.org/uc/item/6w07422s

Hill, M., & Smith, A. (1976). Principal component analysis of taxonomic data with multi-state discrete characters. *Taxon*, *25*(2), 249–255. http://www.jstor.org/stable/1219449

Holling, C. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, *4*, 1–23. http://www.jstor.org/stable/2096802

Hotelling, H. (1933). Analysis of a complex of statistical variables into principal components. *Journal of Educational Psychology*, *24*(7), 498–520. https://doi.org/10.1037/h0070888

Hough, J. (1993). Why burn the bush? Social approaches to bush-fire management in West African national parks. *Biological Conservation*, *65*(1), 23–28. https://doi.org/10.1016/0006-3207(93)90192-4

Husson, F., & Josse, J. (2014). Multiple correspondence analysis. In M. Greenacre & J. Blasius (Eds.), *Visualization and verbalization of data*. Chapman and Hall/CRC.

https://www.researchgate.net/publication/266856006_Multiple_Correspondence_Analysis

Hutcheson, G. (1999). *The Multivariate Social Scientist*. SAGE Publications, Ltd. https://doi.org/10.4135/9780857028075

IPCC. (2007). *Climate change 2007: Synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change* (p. 104). Cambridge University Press. https://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

IPCC. (2012). *Managing the risks of extreme events and disasters to advance climate change adaptation. A special report of working groups I and II of the Intergovernmental Panel on Climate Change* (p. 582). Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/03/SREX_Full_Report-1.pdf

Iseke, J. (2013). Indigenous storytelling as research. *International Review of Qualitative Research*, *6*(4), 559–577. https://doi.org/10.1525/irqr.2013.6.4.559

Islam, M., & Zhang, Y. (2018). The potential of strategic environmental assessment to reduce disaster risks through climate change adaptation in the coastal zone of Bangladesh. *International Journal of Climate Change Strategies and Management*, *11*(1), 137–153. https://doi.org/10.1108/IJCCSM-11-2017-0201

Jacobi, J., Schneider, M., Pillco Mariscal, M., Huber, S., Weidmann, S., Bottazzi, P., & Rist, S. (2015). Farm resilience in organic and nonorganic cocoa farming systems in Alto Beni, Bolivia. *Agroecology and Sustainable Food Systems*, *39*(7), 798–823. https://doi.org/10.1080/21683565.2015.1039158

Johnson, P. (2016). Indigenous knowledge within academia: Exploring the tensions that exist between indigenous, decolonizing, and Nêhiyawak methodologies. *Totem: The University of Western Ontario Anthropology Journal*, *24*(1), 44–61. https://ir.lib.uwo.ca/totem/vol24/iss1/4/

Johnson, R., & Wichern, D. (2019). *Applied multivariate statistical analysis*. Pearson.

Jones, P., & Thornton, P. (2003). The potential impacts of climate change on maize production in Africa and Latin America in 2055. *Global Environmental Change*, *13*(1), 51–59. https://doi.org/10.1016/S0959-3780(02)00090-0

Kaciak, E., & Louviere, J. (1990). Multiple correspondence analysis of multiple choice experiment data. *Journal of Marketing Research*, *27*(4), 455–465. https://doi.org/10.1177/002224379002700407

Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1), 31–36. https://doi.org/10.1007/BF02291575

Kalu, K., & Falola, T. (2019). Introduction: Exploitation, Colonialism, and Postcolonial Misrule in Africa. In K. Kalu & T. Falola (Eds.), *Exploitation and Misrule in Colonial and Postcolonial Africa* (pp. 1–23). Springer International Publishing. https://doi.org/10.1007/978-3-319-96496-6_1

Khangar, N., & Kamalja, K. (2017). Multiple correspondence analysis and its applications. *Electronic Journal of Applied Statistical Analysis*, *10*(2), 432–462. https://doi.org/10.1285/i20705948v10n2p432

Kibler, K. (2020). Case study: Resilience to food insecurity in Bikotiba, Togo. In J. Gruber (Ed.), *Building community: 12 principles for a healthy future* (pp. 116–124). New Society. https://ebookcentral-proquest-com.antioch

.idm.oclc.org/lib/antiochne-ebooks/reader.action?docID=5820161&ppg=126

Kiers, H. (1991). Simple structure in component analysis techniques for mixtures of qualitative and quantitative variables. *Psychometrika*, *56*(2), 197–212. https://doi.org/10.1007/BF02294458

Kim, N. (2010). A mission to the "Graveyard of Empires"? Neocolonialism and the contemporary evangelical missions of the global south. *Mission Studies: Journal of the International Association for Mission Studies*, *27*(1), 3–23. https://doi.org/10.1163/157338310X497946

Kinloch, V., & San Pedro, T. (2014). The space between listening and storying: Foundations for projects in humanization. In D. Paris & M. Winn (Eds.), *Humanizing research: Decolonizing qualitative inquiry with youth and communities* (pp. 21–42). SAGE Publications, Inc. https://dx.doi.org/10.4135/9781544329611.n2

Knox, J., Hess, T., Daccache, A., & Wheeler, T. (2012). Climate change impacts on crop productivity in Africa and South Asia. *Environmental Research Letters*, *7*(3), 1–8. https://doi.org/10.1088/1748-9326/7/3/034032

Kohnert, D. (2021). *Togo's political and socio-economic development (2019 – 2021)* (p. 63). BTI. https://www.econstor.eu/bitstream/10419/225334/1/BTI-2021-Togo-AuthorsVersion.pdf

Kremen, C. (2015). Reframing the land-sparing/land-sharing debate for biodiversity conservation. *Annals of the New York Academy of Sciences*, *1355*(1), 52–76. https://doi.org/10.1111/nyas.12845

Kremen, C., & Miles, A. (2012). Ecosystem services in biologically diversified versus conventional farming systems: Benefits, externalities, and trade-offs. *Ecology & Society*, *17*(4), 153–177. https://doi.org/10.5751/ES-05035-170440

Kumar, M., & Pattanayak, S. (2018). *Positioning research: Shifting paradigms, interdisciplinarity and indigeneity*. SAGE Publications, Inc. https://doi.org/10.4135/9789353282509

Kumasi, T. C., Antwi-Agyei, P., & Obiri-Danso, K. (2019). Small-holder farmers' climate change adaptation practices in the Upper East Region of Ghana. *Environment, Development and Sustainability : A Multidisciplinary Approach to the Theory and Practice of Sustainable Development*, *21*(2), 745–762. https://doi.org/10.1007/s10668-017-0062-2

Lal, R., Singh, B., Mwaseba, D., Kraybill, D., Hansen, D., & Eik, L. (Eds.). (2015). *Sustainable intensification to advance food security and enhance climate resilience in Africa*. Springer International Publishing. https://doi.org/10.1007/978-3-319-09360-4

Lavrakas, P. (2011). *Encyclopedia of survey research methods*. SAGE Publications, Inc. http://www.credoreference.com/book/sagesurveyr

Lawson, H. A., Caringi, J. C., Pyles, L., Jurkowski, J. M., & Bozlak, C. T. (2015). *Participatory action research*. Oxford University Press. https://books.google.com/books/about/Participatory_Action_Research.html?id=TxIoBgAAQBAJ

Le Grange, L. (2001). Challenges for participatory action research and indigenous knowledge in Africa. *Acta academica*, *33*(3), 136–150. https://hdl.handle.net/10520/EJC15220

le Grange, L. (2018). Decolonising, Africanising, indigenising, and internationalising curriculum studies: Opportunities to (re)imagine the field. *Journal of Education (University of KwaZulu-Natal)*, *74*, 4–18. https://doi.org/10.17159/2520-9868/i74a01

Le Privé, C. (2020). *COVID-19: 50 million people threatened by hunger in West Africa*. Oxfam International. https://www.oxfam.org/en/press-releases/covid-19-50-million-people-threatened-hunger-west-africa

Le Roux, B., & Rouanet, H. (2009). *Multiple correspondence analysis*. SAGE Publications, Inc. http://public.ebookcentral.proquest.com/choice/publicfullrecord.aspx?p=1995066

Lebot, V., & Siméoni, P. (2015). Community food security: Resilience and vulnerability in Vanuatu. *Human Ecology*, *43*(6), 827–842. https://doi.org/10.1007/s10745-015-9796-3

Leitner, S., Pelster, D. E., Werner, C., Merbold, L., Baggs, E. M., Mapanda, F., & Butterbach-Bahl, K. (2020). Closing maize yield gaps in sub-Saharan Africa will boost soil N2O emissions. *Current Opinion in Environmental Sustainability*, *47*, 95–105. https://doi.org/10.1016/j.cosust.2020.08.018

Lemke, S., & Delormier, T. (2017). Indigenous Peoples' food systems, nutrition, and gender: Conceptual and methodological considerations. *Maternal & Child Nutrition*, *13*(3), 1–12. https://doi.org/10.1111/mcn.12499

Lichtman, M. (2014). *Qualitative research for the social sciences*. SAGE Publications, Inc. https://doi.org/10.4135/9781544307756

Linneberg, M., & Korsgaard, S. (2019). Coding qualitative data: A synthesis guiding the novice. *Qualitative Research Journal*, *19*(3), 259–270. http://dx.doi.org.antioch.idm.oclc.org/10.1108/QRJ-12-2018-0012

Liu, Y., & Xue, Y. (2020). Expansion of the Sahara Desert and shrinking of frozen land of the Arctic. *Scientific Reports*, *10*, 1–9. https://doi.org/10.1038/s41598-020-61085-0

Logan, M. K. (1999). Chapter 1: Africa and Europe. In *Narrating Africa* (pp. 3–24). Taylor & Francis Ltd.

Lohmöller, J.-B. (1989). *Latent Variable Path Modeling with Partial Least Squares*. Physica-Verlag HD. https://doi.org/10.1007/978-3-642-52512-4

Lombardo, R., & Meulman, J. (2010). Multiple correspondence analysis via polynomial transformations of ordered categorical variables. *Journal of Classification*, *27*(2), 191–210. http://hdl.handle.net/10.1007/s00357-010-9056-6

Lukhele-Olorunju, P., Nkosi, S., & Gwandure, C. (2021). Land Reform and Climate Change in South Africa: Adaptation and Mitigation Through Indigenous Knowledge Systems. *Journal of Public Administration*, *56*(1), 93–105. https://doi.org/10.10520/ejc-jpad-v56-n1-a8

Lunga, W., & Musarurwa, C. (2016). Indigenous food security revival strategies at the village level: The gender factor implications. *Jamba: Journal of Disaster Risk Studies*, *8*(2), 1–7. https://doi.org/10.4102/jamba.v8i2.175

Lwoga, E., Ngulube, P., & Stilwell, C. (2010). Understanding indigenous knowledge: Bridging the knowledge gap through a knowledge creation model for agricultural development. *South African Journal of Information Management*, *12*(1), e1–e8. https://doi.org/10.4102/sajim.v12i1.436

Maechler, M., Rousseeuw, P., Croux, C., Todorov, V., Ruckstuhl, A., Salibian-Barrera, M., Verbeke, T., Koller, M., Conceicao, E., & di Palma, M. (2021). *Basic robust statistics* (Version 0.93-7) [CRAN; RStudio]. http://robustbase.r-forge.r-project.org/

Magomedov, I., Dzhabrailov, Z., & Bagov, A. (2021). Subsistence agriculture and Global Warming. *IOP Conference Series: Earth and Environmental Science*, *677*(3), 1–4. https://doi.org/10.1088/1755-1315/677/3/032109

Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring rigor in qualitative data analysis: A design research approach to coding combining NVivo with traditional material methods. *International Journal of Qualitative Methods*, *17*(1), 1–13. https://doi.org/10.1177/1609406918786362

Malone, E. (2002). Hot topics: Globalization and climate change. *Social Thought & Research*, *25*(1–2), 143–173. https://www.jstor.org/stable/23250009

Martin, G., & Magne, M. (2015). Agricultural diversity to increase adaptive capacity and reduce vulnerability of livestock systems against weather variability – A farm-scale simulation study. *Agriculture, Ecosystems & Environment*, *199*, 301–311. https://doi.org/10.1016/j.agee.2014.10.006

Martin, W. (2019). South Africa and the New Scramble: The Demise of Sub-imperialism and the Rise of the East. In S. Moyo, P. Jha, & P. Yeros (Eds.), *Reclaiming Africa: Scramble and Resistance in the 21st Century* (pp. 51–72). Springer. https://doi.org/10.1007/978-981-10-5840-0_3

Massey, A., & Kirk, R. (2015). Bridging indigenous and western sciences: Research methodologies for traditional, complementary, and alternative medicine systems. *SAGE Open*, *5*(3), 1–15. https://doi.org/10.1177/2158244015597726

Mataira, P. J. (2019). Transforming Indigenous research: Collaborative responses to historical research tensions. *International Review of Education : Journal of Lifelong Learning*, *65*(1), 143–161. https://doi.org/10.1007/s11159-019-09766-5

Matiluko, O. (2020). Decolonising the master's house: How Black Feminist epistemologies can be and are used in decolonial strategy. *The Law Teacher*, *54*(4), 547–561. https://doi.org/10.1080/03069400.2020.1827839

Matsa, M. (2021). *Climate change and agriculture in Zimbabwe: Sustainability in minority farming communities* (Vol. 1–1 online resource). Springer. https://doi.org/10.1007/978-3-030-51346-7

Matthews, S. (2012). White anti-racism in post-apartheid South Africa. *Politikon*, *39*(2), 171–188. https://doi.org/10.1080/02589346.2012.683938

McCann, J. (2001). Maize and grace: History, corn, and Africa's new landscapes, 1500–1999. *Comparative Studies in Society and History*, *43*(2), 246–272. https://doi.org/10.1017/S0010417501003486

McIntosh, C., Edwards, J., & Antonakis, J. (2014). Reflections on partial least squares path modeling. *Organizational Research Methods*, *17*(2), 210–251. https://doi.org/10.1177/1094428114529165

McLaren, M. (2017). *Decolonizing feminism: Transnational feminism and globalization*. Rowman & Littlefield International Ltd,. https://rowman.com/ISBN/9781786602589/Decolonizing-Feminism-Transnational-Feminism-and-Globalization

Melesse, D., Mutua, M., Choudhury, A., Wado, Y., Faye, C., Neal, S., & Boerma, T. (2020). Adolescent sexual and reproductive health in sub-Saharan Africa: Who is left behind? *BMJ Global Health*, *5*(002231), 1–8. https://doi.org/10.1136/bmjgh-2019-002231

Michon, G., de Foresta, H., Levang, P., & Verdeaux, F. (2007). Domestic forests: A new paradigm for integrating local communities' forestry into tropical forest science. *Ecology & Society*, *12*(2), 1–24. https://doi.org/10.5751/ES-02058-120201

Milestad, R., & Darnhofer, I. (2003). Building farm resilience: The prospects and challenges of organic farming. *Journal of Sustainable Agriculture*, *22*(3), 81–97. https://doi.org/10.1300/J064v22n03_09

Miller, T., Birch, M., Mauthner, M., & Jessop, J. (Eds.). (2012). *Ethics in qualitative research*. SAGE Publications Inc. https://dx.doi.org/10.4135/9781473913912

Minthorn, R., & Shotton, H. (2018). *Reclaiming indigenous research in higher education*. Rutgers University Press. https://doi.org/10.2307/j.ctt1v2xw7v

Mooney, H., Larigauderie, A., Cesario, M., Elmquist, T., Hoegh-Guldberg, O., Lavorel, S., Mace, G., Palmer, M., Scholes, R., & Yahara, T. (2009). Biodiversity, climate change, and ecosystem services. *Current Opinion in Environmental Sustainability*, *1*(1), 46–54. https://doi.org/10.1016/j.cosust.2009.07.006

Moosa-Mitha, M. (2005). Situating anti-oppressive theories within critical and difference-centred perspectives. In Brown, Leslie & S. Strega (Eds.), *Research as resistance: Critical, indigenous, and anti-oppressive approaches*. Canadian Scholar's Press, Inc. https://www.canadianscholars.ca/books/research-as-resistance-2nd-edition

Mueller, N. D., Gerber, J. S., Johnston, M., Ray, D. K., Ramankutty, N., & Foley, J. A. (2012). Closing yield gaps through nutrient and water management. *Nature*, *490*(7419), 254–257. https://doi.org/10.1038/nature11420

Mulder, C. (2015). 10 years later: Revisiting priorities for science and society a decade after the millennium ecosystem assessment. *Advances in Ecological Research*, *53*, 1–53. https://doi.org/10.1016/bs.aecr.2015.10.005

Munawar, M., Shiwei, X., Wen, Y., & Luqman, M. (2021). Resilience to food insecurity among rural households in the Punjab, Pakistan. *Sarhad Journal of Agriculture*, *37*(3). https://doi.org/10.17582/journal.sja/2021/37.3.754.762

Murray, J. (2021). Feminism. In *Chambers*. Hodder & Stoughton Ltd. https://chambers.co.uk/search/?query=feminism&title=21st

Murton, J., Bavington, D., & Dokis, C. (2016). *Subsistence under capitalism: Historical and contemporary perspectives*. McGill-Queen's University Press. https://www.deslibris.ca/ID/450262

Nabhan, H., Mermut, A., & Mashali, A. (1999). *Integrated soil management for sustainable agriculture and food security in southern and East Africa: Proceedings of the expert consultation* (p. 415). Food and Agriculture Organization of the United Nations.

Nadasdy, P. (1999). The politics of TEK: Power and the "integration" of knowledge. *Arctic Anthropology*, *36*(1–2), 1–18. https://www.jstor.org/stable/40316502

Nagar, R. (2015). *Muddying the waters: Coauthoring feminisms across scholarship and activism*. University of Illinois Press. https://www.press.uillinois.edu/books/nagar/muddying_waters/index.html

Nah, A. (2003). Negotiating indigenous identity in postcolonial Malaysia: Beyond being 'not quite/not Malay.' *Social Identities*, *9*(4), 511–534. https://doi.org/10.1080/1350463032000174650

N'Bohn, N. (2013). *Croissance demographique et problemes educatifs dans ls prefecture de Bassar* [Unpublished doctoral dissertation]. Universite du Kara.

Nencel, L. (2014). Situating reflexivity: Voices, positionalities and representations in feminist ethnographic texts. *Women's Studies International Forum*, *43*, 75–83. https://doi.org/10.1016/j.wsif.2013.07.018

Niang, I., Ruppel, O., Abdrabo, M., Essel, A., Lennard, C., Padgham, J., & Urquhart, P. (2014). Africa. In V. Barros, C. Field, D. Dokken, K. Mastrandrea, T. Bilir, K. Chatterjee, Y. Ebi, R. Genova, B. Girma, E. Kissel, A. Levy, P. MacCracken, P. Mastrandrea, & L. White (Eds.), *Climate change 2014: Impacts, adaptation, and vulnerability. Part B: Regional aspects. Contribution of working group II to the fifth assessment report of the Intergovernmental Panel on Climate Change* (pp. 1199–1265). Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap22_FINAL.pdf

Noglo, Y. (2017). Non-monetary poverty in Togo: A multidimensional approach. *Review of Social Economy*, *75*(2), 181–211. https://doi.org/10.1080/00346764.2016.1219385

Norberg, J., & Cumming, G. (2008). *Complexity theory for a sustainable future*. Columbia University Press. https://cup.columbia.edu/book/complexity-theory-for-a-sustainable-future/9780231134613

Nyamangara, J., Masvaya, E., Tirivavi, R., & Nyengerai, K. (2013). Effect of hand-hoe based conservation agriculture on soil fertility and maize yield in selected smallholder areas in Zimbabwe. *Soil and Tillage Research*, *126*, 19–25. https://doi.org/10.1016/j.still.2012.07.018

Nyoni, S. (1987). Indigenous NGOs: Liberation, self-reliance, and development. *World Development: Supplement 1*, *15*(Supplement 1), 51–56. https://doi.org/10.1016/0305-750X(87)90142-2

Oborn, I. (2017). *Sustainable intensification in smallholder agriculture: An integrated systems research approach*. Routledge. https://doi.org/10.4324/9781315618791

Oduro, A., Aryee, I., & Chronic Poverty Research Centre. (2003). *Investigating chronic poverty in West Africa*. Chronic Poverty Research Centre. http://www.chronicpoverty.org/uploads/publication_files/WP28_Oduro_Aryee.pdf

Ofori-Boateng, K., & Insah, B. (2014). The impact of climate change on cocoa production in West Africa. *International Journal of Climate Change Strategies and Management*, *6*(3), 296–314. https://doi.org/10.1108/IJCCSM-01-2013-0007

Ofori-Sarpong, E., & Asante, F. (2004a). Farmer strategies of managing agrodiversity in a variable climate in PLEC demonstration sites in southern Ghana. In E. Gyasi, G. Kranjac-Berisavljevic, E. Blay, & W. Oduro (Eds.), *Managing agrodiversity the traditional way: Lessons from West Africa in sustainable use of biodiversity and related natural resources* (pp. 25–37). United Nations University Press.

Ofori-Sarpong, E., & Asante, F. (2004b). The proka mulching and no-burn system: A case study of Tano-Odumasi and Jachie. In E. Gyasi, G. Kranjac-Berisavljevic, E. Blay, & W. Oduro (Eds.), *Managing agrodiversity the traditional way: Lessons from West Africa in sustainable use of biodiversity and related natural resources* (pp. 119–134). United Nations University Press.

Olive, D. (2017). *Robust multivariate analysis* (Vol. 1–1). Springer. https://www.springer.com/gp/book/9783319682518

Oluoko-Odingo, A. A. (2011). Vulnerability and Adaptation to Food Insecurity and Poverty in Kenya. *Annals of the Association of American Geographers*, *101*(1), 1–20. https://doi.org/10.1080/00045608.2010.532739

Oparah, J., & Okazawa-Rey, M. (2016). *Activist scholarship: Antiracism, feminism, and social change*. Routledge. https://www.researchgate.net/publication/254950905_Activist_Scholarship_Antiracism_Feminism_and_Social_Change_review

Osai, O. J. (2010). On the Mindset of Imperialism: A Contemporary Review of the Works of Edmund Burke. *Journal of Alternative Perspectives in the Social Sciences*, *2*(2).

Osborne, S. (2001). *Feminism*. Pocket Essentials. https://www.academia.edu/5823549/Feminism_Pocket_Essential_series

Owusu Danquah, E., Beletse, Y., Stirzaker, R., Smith, C., Yeboah, S., Oteng-Darko, P., Frimpong, F., & Ennin, S. A. (2020). Monitoring and modelling analysis of maize (zea mays l.) yield gap in smallholder farming in Ghana. *Agriculture*, *10*(9), 420. https://doi.org/10.3390/agriculture10090420

Owusu-Ansah, F., & Mji, G. (2013). African indigenous knowledge and research. *African Journal of Disability*, *2*(1), 1–5. https://doi.org/10.4102/ajod.v2i1.30

OXFAM. (2020, July 14). *West Africa: Extreme inequality in numbers*. Oxfam International. https://www.oxfam.org/en/west-africa-extreme-inequality-numbers

Pagett, R. (2018). *Building global resilience in the aftermath of sustainable development: Planet, people and politics*. Palgrave Macmillan. https://doi.org/10.1007/978-3-319-62151-7

Paris, D., & Winn, M. (2014). *Humanizing research: Decolonizing qualitative inquiry with youth and communities*. SAGE Publications, Inc.

Pashby, K., da Costa, M., Stein, S., & Andreotti, V. (2020). A meta-review of typologies of global citizenship education. *Comparative Education*, *56*(2), 144–164. https://doi.org/10.1080/03050068.2020.1723352

Pashby, K., & Sund, L. (2020). Decolonial options and foreclosures for global citizenship education and education for sustainable development. *Nordic Journal of Comparative and International Education (NJCIE)*, *4*(1), 66–83. https://doi.org/10.7577/njcie.3554

Pert, P., Hill, R., Maclean, K., Dale, A., Rist, P., Schmider, J., Talbot, L., & Tawake, L. (2015). Mapping cultural ecosystem services with rainforest aboriginal peoples: Integrating biocultural diversity, governance and social variation. *Ecosystem Services*, *13*, 41–56. https://doi.org/10.1016/j.ecoser.2014.10.012

Phillips, A. (2007). *Multiculturalism without culture*. Princeton University Press. https://www.jstor.org/stable/j.ctt7rv6q

Picq, M. (2013). Critics at the edge? Decolonizing methodologies in international relations. *International Political Science Review*, *34*(4), 444–455. https://doi.org/10.1177/0192512113493224

Pillow, W., & Mayo, C. (2012). Feminist ethnography: Histories, challenges, and possibilities. In S. Hesse-Bibber (Ed.), *Handbook of feminist research: Theory and praxis* (pp. 187–205). SAGE Publications, Inc. https://dx.doi.org/10.4135/9781483384740.n10

Pine, G. (2008). *Teacher action research: Building knowledge democracies.* SAGE Publications, Inc. http://dx.doi.org/10.4135/9781452275079

Pingali, P. (2007). Agricultural growth and economic development: A view through the globalization lens. *Agricultural Economics*, *37*(1), 1–12. https://doi.org/10.1111/j.1574-0862.2007.00231.x

Piot, C. (2010). *Nostalgia for the future: West Africa after the Cold War*. University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/N/bo8697270.html

Post, E. (2013). *Ecology of climate change: The importance of biotic interactions*. Princeton University Press. https://www.jstor.org/stable/j.ctt2jc8jj

Post, G., Visser, V., & Buis, J. (2016). *Academic skills for interdisciplinary studies*. Amsterdam University Press. https://doi.org/10.2307/j.ctt1xhr51h

Powell, M., Pearson, A., & Hiernaux, P. (2004). Crop–livestock interactions in the west African drylands. *Agronomy Journal*, *96*(2), 469. https://doi.org/10.2134/agronj2004.0469

Purwandari, T., Ginanjar, I., & Dewi, D. (2021). Multiple correspondence analysis for identifying the contribution of infant mortality indicator categories. *Journal of Physics: Conference Series*, *1776*(1), 1–10. https://doi.org/10.1088/1742-6596/1776/1/012064

Riach, K. (2009). Exploring Participant-centred Reflexivity in the Research Interview. *Sociology*, *43*(2), 356–370. https://doi.org/10.1177/0038038508101170

Richmond, L., Middleton, B., Gilmer, R., Grossman, Z., Janis, T., Lucero, S., Morgan, T., & Watson, A. (2013). Indigenous studies speaks to environmental management. *Environmental Management*, *52*(5), 1041–1045. https://doi.org/10.1007/s00267-013-0173-y

Riede, J., Posada, R., Fink, A., & Kaspar, F. (2016). What's on the 5th IPCC Report for West Africa? In J. Yaro & J. Hesselberg (Eds.), *Adaptation to Climate Change and Variability in Rural West Africa* (pp. 7–23). Springer International Publishing. https://doi.org/10.1007/978-3-319-31499-0_2

Rihani, S. (2002). *Complex systems theory and development practice*. Zed Books.

Ringnér, M. (2008). What is principal component analysis? *Nature Biotechnology*, *26*(3), 303–304. https://doi.org/10.1038/nbt0308-303

Romano, R., & Palumbo, F. (2021). Partial possibilistic regression path modeling: Handling uncertainty in path modeling. *Computational Statistics*, *36*, 615–639. https://doi.org/10.1007/s00180-020-01026-7

Roulston, K., deMarrais, K., & Lewis, J. (2003). Learning to interview in the social sciences. *Qualitative Inquiry*, *9*(4), 643–668. https://doi.org/10.1177/1077800403252736

Rousseeuw, P., & Van Driessen, K. (1999). A fast algorithm for the minimum covariance determinant estimator. *Technometrics*, *41*(3), 212–223. https://doi.org/10.1080/00401706.1999.10485670

RStudio Team. (2020). *RStudio: Integrated development for RStudio* (Version 4.0.5 (2021-03-31)) [Computer software]. RStudio, PBC. http://www.rstudio.com/

Rudi, L.-M., Azadi, H., & Witlox, F. (2012). Reconcilability of socio-economic development and environmental conservation in sub-Saharan Africa. *Global and Planetary Change*, *86–87*, 1–10. https://doi.org/10.1016/j.gloplacha.2011.12.004

Rudnev, V. (2015). Indigenous knowledge: Searching for a model of sustainable development for humankind. *Global Bioethics*, *26*(2), 46–51. https://doi.org/10.1080/11287462.2015.1038099

Sagalova, V., Vollmer, S., Ntambi, J., Sodjinou, R., Simen-Kapeu, A., Bärnighausen, T., Zagre, N. M., & Nanama, S. (2021). Socio-economic predictors of undernutrition and anaemia in adolescent mothers in West and Central Africa. *Journal of Global Health*, *11*, 13007. https://doi.org/10.7189/jogh.11.13007

Saldaña, J. (2013). *The coding manual for qualitative researchers*. SAGE Publications, Inc. https://us.sagepub.com/en-us/nam/book/coding-manual-qualitative-researchers-1

Salinger, M., Sivakumar, M., & Motha, R. (2005). Reducing vulnerability of agriculture and forestry to climate variability and change: Workshop summary and recommendations. *Climatic Change*, *70*(1–2), 341–362. https://doi.org/10.1007/s10584-005-5954-8

Samani, S. (2016). Steps in research process (partial least square of structural equation modeling (PLS-SEM) a review). *International Journal of Social Science and Business*, *1*(2), 55–66. https://www.ijssb.com/images/vol1no2/5.pdf

Sanchez, G. (2013). *PLS path modeling with R*. Trowchez Editions. https://www.gastonsanchez.com/PLS_Path_Modeling_with_R.pdf

Sanchez, P. (2000). Linking climate change research with food security and poverty reduction in the tropics. *Agriculture, Ecosystems & Environment*, *82*(1–3), 371–383. https://doi.org/10.1016/S0167-8809(00)00238-3

Sandhu, H. (2021). Bottom-up transformation of agriculture and food systems. *Sustainability*, *13*(4), 1–13. https://doi.org/10.3390/su13042171

Saracco, J., & Chavent, M. (2016). Clustering of variables for mixed data. *EAS Publications Series*, *77*, 121–169. https://doi.org/10.1051/eas/1677007

Schamberger, T., Schuberth, F., Henseler, J., & Dijkstra, T. (2020). Robust partial least squares path modeling. *Behaviormetrika*, *47*(1), 307–334. https://doi.org/10.1007/s41237-019-00088-2

Semali, L., & Maretzki, A. (2004). Valuing Indigenous Knowledges: Strategies for Engaging Communities and Transforming the Academy. *Journal of Higher Education Outreach and Engagement*, *10*(1), 91–106.

Sieber, S., Jha, S., Tharayil Shereef, A.-B., Bringe, F., Crewett, W., Uckert, G., Polreich, S., Ndah, T., Graef, F., & Mueller, K. (2015). Integrated assessment of sustainable agricultural practices to enhance climate resilience in Morogoro, Tanzania. *Regional Environmental Change*, *15*(7), 1281–1292. https://doi.org/10.1007/s10113-015-0810-5

Sileshi, G., Nyeko, P., Nkunika, P., Sekematte, B., Akinnifesi, F., & Ajayi, O. (2009). Integrating ethno-ecological and scientific knowledge of termites for sustainable termite management and human welfare in Africa. *Ecology & Society*, *14*(1), 1–21. http://www.ecologyandsociety.org/vol14/iss1/art48/

Simonds, V. W., & Christopher, S. (2013). Adapting Western Research Methods to Indigenous Ways of Knowing. *American Journal of Public Health*, *103*(12), 2185–2192. https://doi.org/10.2105/AJPH.2012.301157

Simpson, L. (2001). *Aboriginal peoples and knowledge: Decolonizing our processes*. *XXI*(1), 137–148. http://www3.brandonu.ca/cjns/21.1/cjnsv21no1_pg137-148.pdf

Sivakumar, M., Das, H., & Brunini, O. (2005). Impacts of present and future climate variability and change on agriculture and forestry in the arid and semi-arid tropics. *Climatic Change*, *70*(1–2), 31–72. https://doi.org/10.1007/s10584-005-5937-9

Skachkova, P. (2000). *The ethnic teaches back: Identity formation and academic status of foreign-born women academics in the U.S.* [Published doctoral dissertation, State University of New York at Buffalo]. https://www.proquest.com/openview/e951d07207be829e960294c03a4598a3/1?pq-origsite=gscholar&cbl=18750&diss=y

Smith, L. (2012). *Decolonizing methodologies: Research and indigenous peoples*. Zed Books. http://catdir.loc.gov/catdir/toc/hol052/98030387.html

Smith, T., Thomsen, D., Gould, S., Schmitt, K., & Schlegel, B. (2013). Cumulative pressures on sustainable livelihoods: Coastal adaptation in the Mekong Delta. *Sustainability*, *5*(1), 228–241. https://doi.org/10.3390/su5010228

Snow, K., Hays, D., Caliwagan, G., Ford, D., Mariotti, D., Mwendwa, J., & Scott, W. (2016). Guiding principles for Indigenous research practices. *Action Research*, *14*(4), 357–375. https://doi.org/10.1177/1476750315622542

Sodhi, N., Posa, M., Lee, T., Bickford, D., Koh, L., & Brook, B. (2010). The state and conservation of Southeast Asian biodiversity. *Biodiversity and Conservation*, *19*(2), 317–328. https://doi.org/10.1007/s10531-009-9607-5

Somda, J., Zougmoré, R., Sawadogo, I., Bationo, B., Buah, S., & Abasse, T. (2017). Adaptation Processes in Agriculture and Food Security: Insights from Evaluating Behavioral Changes in West Africa. In J. Uitto, J. Puri, & R. van den Berg (Eds.), *Evaluating Climate Change Action for Sustainable Development* (pp. 255–269). Springer International Publishing. https://doi.org/10.1007/978-3-319-43702-6_14

Stephens, A., Jacobson, C., & King, C. (2010). Describing a feminist-systems theory. *Systems Research and Behavioral Science*, *27*(5), 553–566. https://doi.org/10.1002/sres.1061

Stephens, C. (2010). Privilege and status in an unequal society: Shifting the focus of health promotion research to include the maintenance of advantage. *Journal of Health Psychology*, *15*(7), 993–1000. https://doi.org/10.1177/1359105310371554

Stiftung, B. (2016). *BTI 2016—Togo country report*. Bertelsmann Stiftung. https://www.researchgate.net/publication/270451569_Togo_political_and_economic_development_2013_to_2016_Author's_extended_and_up-dated_version_of_'BTI_2016_-_Togo_Country_Report'

Stimeling, T., & Enriquez, S. (2019). Building relationships, sustaining communities: Decolonial directions in higher ed bluegrass pedagogy. *Intersections*, *39*(1), 57–72. https://doi.org/10.7202/1075342ar

Stork, N. (2010). Re-assessing current extinction rates. *Biodiversity and Conservation*, *19*(2), 357–371. https://doi.org/10.1007/s10531-009-9761-9

Sultan, B., & Gaetani, M. (2016). Agriculture in west Africa in the twenty-first century: Climate change and impacts scenarios, and potential for adaptation. *Frontiers in Plant Science*, *7*, 1–20. https://doi.org/10.3389/fpls.2016.01262

Swadener, B. B., & Mutua, K. (2008). Decolonizing Performances: Deconstructing the Global Postcolonial. In N. Denzin, Y. Lincoln, & L. Smith (Eds.), *Handbook of Critical and Indigenous Methodologies* (pp. 31–44). SAGE Publications, Inc. https://doi.org/10.4135/9781483385686.n2

Swantz, M.-L. (2015). Participatory action research: Its origins and future in women's ways. In H. Bradbury (Ed.), *The SAGE handbook of action research* (pp. 489–496). SAGE Publications, Inc. https://doi.org/10.4135/9781473921290.n49

Tambo, J., & Wünscher, T. (2017). Enhancing resilience to climate shocks through farmer innovation: Evidence from northern Ghana. *Regional Environmental Change*, *17*(5), 1505–1514.

Tate, S. (2019). *Decolonizing sambo: Transculturation, fungibility and black and people of colour futurity.* Emerald Publishing Limited. https://doi.org/10.1108/9781789733471

Teixeira, E., Fischer, G., van Velthuizen, H., Walter, C., & Ewert, F. (2013). Global hot-spots of heat stress on agricultural crops due to climate change. *Agricultural and Forest Meteorology*, *170*, 206–215. https://doi.org/10.1016/j.agrformet.2011.09.002

Tenenhaus, A., & Tenenhaus, M. (2010). Analyse canonique généralisée régularisée et approche PLS. *42èmes Journées de Statistique*, 1–7. https://hal.inria.fr/inria-00494675/document

Tenenhaus, M. (2008). Component-based structural equation modeling. *Total Quality Management & Business Excellence*, *19*(7–8), 871–886. https://doi.org/10.1080/14783360802159543

Tenenhaus, M. (2010, July 25). *Structural equation modelling for small samples*. Groupement de Recherche et d'Etudes en Gestion à HEC, Rotterdam, Netherlands. https://hal-hec.archives-ouvertes.fr/hal-00554108

Tesfaye, K., Gbegbelegbe, S., Cairns, J., Shiferaw, B., Prasanna, B. M., Sonder, K., Boote, K., Makumbi, D., & Robertson, R. (2015). Maize systems under climate change in sub-Saharan Africa. *International Journal of Climate Change Strategies and Management*, *7*(3), 247–271. https://doi.org/10.1108/IJCCSM-01-2014-0005

Thambinathan, V., & Kinsella, E. (2021). Decolonizing methodologies in qualitative research: Creating spaces for transformative praxis. *International Journal of Qualitative Methods*, *20*, 1–9. https://doi.org/10.1177/16094069211014766

Thrupp, L. (2000). Linking agricultural biodiversity and food security: The valuable role of agrobiodiversity for sustainable agriculture. *International Affairs*, *76*(2), 265–281. https://doi.org/10.1111/1468-2346.00133

Thuiller, W. (2006). Vulnerability of African mammals to anthropogenic climate change under conservative land transformation assumptions. *Global Change Biology*, *12*(3), 424–440. https://doi.org/10.1111/j.1365-2486.2006.01115.x

Tittonell, P., & Giller, K. (2013). When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture. *Field Crops Research*, *143*, 76–90. https://doi.org/10.1016/j.fcr.2012.10.007

Trainor, A., & Bouchard, K. (2013). Exploring and developing reciprocity in research design. *International Journal of Qualitative Studies in Education*, *26*(8), 986–1003. https://doi.org/10.1080/09518398.2012.724467

Tschakert, P., & Shaffer, L. (2014). Ingredients for social-ecological resilience, poverty traps, and adaptive social protection in semi-arid Africa. In S. Sakai & C. Umetsu (Eds.), *Social-ecological systems in transition* (pp. 139–156). Springer Japan. https://link.springer.com/book/10.1007/978-4-431-54910-9

Tscharntke, T., Clough, Y., Wanger, T., Jackson, L., Motzke, I., Perfecto, I., Vandermeer, J., & Whitbread, A. (2012). Global food security, biodiversity conservation and the future of agricultural intensification. *Biological Conservation*, *151*(1), 53–59. https://doi.org/10.1016/j.biocon.2012.01.068

Tubadji, A., & Pelzel, F. (2015). Culture based development: Measuring an invisible resource using the PLS-PM method. *International Journal of Social Economics*, *42*(12), 1050–1070. https://doi.org/10.1108/IJSE-01-2014-0005

Turner, N., Ignace, M., & Ignace, R. (2000). Traditional ecological knowledge and wisdom of Aboriginal peoples in British Columbia. *Ecological Applications*, *10*(5), 1275–1287. https://doi.org/10.2307/2641283

Turner, W., Bradley, B., Estes, L., Hole, D., Oppenheimer, M., & Wilcove, D. (2010). Climate change: Helping nature survive the human response. *Conservation Letters*, *3*(5), 304–312. https://doi.org/10.1111/j.1755-263X.2010.00128.x

Twikirize, J. M., & Spitzer, H. (2019). *Social work practice in Africa: Indigenous and innovative approaches*. Fountain Publishers.

UNICEF. (2020). *West and Central Africa: More than 15 million cases of acute malnutrition expected in 2020*. https://www.unicef.org/press-releases/west-and-central-africa-more-15-million-cases-acute-malnutrition-expected-2020

van Ittersum, M., van Bussel, L., Wolf, J., Grassini, P., van Wart, J., Guilpart, N., Claessens, L., de Groot, H., Wiebe, K., Mason-D'Croz, D., Yang, H., Boogaard, H., van Oort, P., van Loon, M., Saito, K., Adimo, O., Adjei-Nsiah, S., Agali, A., Bala, A., … Cassman, K. (2016). Can sub-Saharan Africa feed itself? *Proceedings of the National Academy of Sciences*, *113*(52), 14964–14969. https://doi.org/10.1073/pnas.1610359113

Vanloqueren, G., & Baret, P. (2009). How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations. *Research Policy*, *38*(6), 971–983. https://doi.org/10.1016/j.respol.2009.02.008

Vinzi, V., Chin, W., Henseler, J., & Wang, H. (2010). Editorial: Perspectives on partial least squares. In V. Vinzi, W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares* (pp. 1–20). Springer. https://doi.org/10.1007/978-3-540-32827-8_1

Vinzi, V., & Russolillo, G. (2013). Partial least squares algorithms and methods. *Wiley Interdisciplinary Reviews: Computational Statistics*, *5*(1), 1–19. https://doi.org/10.1002/wics.1239

Vinzi, V., Trinchera, L., & Amato, S. (2010). PLS path modeling: From foundations to recent developments and open issues for model assessment and improvement. In V. Vinzi, W. Chin, J. Henseler, & H. Wang (Eds.), *Handbook of partial least squares* (pp. 47–82).

Spring Handbooks of Computational Statistics. https://doi.org/10.1007/978-3-540-32827-8_3

Wane, N. (2005). African Indigenous knowledge: Claiming, writing, storing, and sharing the discourse. *Journal of Thought*, *40*(2), 27–46. https://www.jstor.org/stable/42589823

Warner, K., Hamza, M., Oliver-Smith, A., Renaud, F., & Julca, A. (2010). Climate change, environmental degradation and migration. *Natural Hazards*, *55*(3), 689–715. https://doi.org/10.1007/s11069-009-9419-7

White, B. (2012). Agriculture and the generation problem: Rural youth, employment and the future of farming. *IDS Bulletin*, *43*(6), 9–19. https://doi.org/10.1111/j.1759-5436.2012.00375.x

White, C., & Denborough, D. (2014). Indigenous research is a journey: An interview with Bagele Chilisa. *The International Journal of Narrative Therapy and Community Work*, *2*, 41–44. https://www.proquest.com/openview/d3cfe64111efb00dae30cf1a62c3fa0f/1?pq-origsite=gscholar&cbl=2031821

Windchief, S., Polacek, C., Cummins, J., Munson, M., & Ulrich, M. (2018). In reciprocity: Responses to critiques of Indigenous methodologies. *Qualitative Inquiry*, *24*(8), 532–542. https://doi.org/10.1177/1077800417743527

Wittig, R., König, K., Schmidt, M., & Szarzynski, J. (2007). A study of climate change and anthropogenic impacts in West Africa. *Environmental Science and Pollution Research - International*, *14*(3), 182–189. https://doi.org/10.1065/espr2007.02.388

Wold, H. (1982). Soft modeling: The basic design and some extensions. In H. Wold & K. Jöreskog (Eds.), *Systems under indirect observations: Part II* (pp. 1–54). https://www.tib.eu/en/search/id/TIBKAT:030736404

Wold, H. (1985). Partial least squares. In S. Kotz, C. Read, N. Balakrishnan, B. Vidakovic, & N. Johnson (Eds.), *Encyclopedia of the Statistical Sciences*. https://onlinelibrary.wiley.com/doi/full/10.1002/0471667196.ess1914.pub2

World Bank. (n.d.). *The World Bank in Togo* [Text/HTML]. The World Bank. Retrieved November 3, 2020, from https://www.worldbank.org/en/country/togo/overview

Worou, O., Tondoh, J., Sanou, J., Gaiser, T., Nikiema, P. M., Bayala, J., Bazié, P., Ky-Dembele, C., & Kalinganiré, A. (2020). Intensifying maize production under climate change scenarios in central west Burkina Faso. In *Handbook of Climate Change Resilience* (pp. 895–916). Springer International Publishing : Springer.

Yaro, J., Teye, J., & Bawakyillenuo, S. (2016). An Assessment of Determinants of Adaptive Capacity to Climate Change/Variability in the Rural Savannah of Ghana. In J. Yaro & J. Hesselberg (Eds.), *Adaptation to Climate Change and Variability in Rural West Africa* (pp. 59–82). Springer International Publishing. https://doi.org/10.1007/978-3-319-31499-0_5

Yegbemey, R. (2020). Farm-level land use responses to climate change among smallholder farmers in northern Benin, West Africa. *Climate and Development*, 1–10. https://doi.org/10.1080/17565529.2020.1844129

Yeros, P. (2002). *The political economy of civilization: Peasant-workers in Zimbabwe and the neo-colonial world.* [Phd, London School of Economics and Political Science]. http://etheses.lse.ac.uk/1682/

Yobom, O. (2020). Climate change and variability: Empirical evidence for countries and agroecological zones of the Sahel. *Climatic Change*, *159*(3), 365–384. https://doi.org/10.1007/s10584-019-02606-3

Younginer, N., Blake, C., Draper, C., & Jones, S. (2015). Resilience and hope: Identifying trajectories and contexts of household food insecurity. *Journal of Hunger & Environmental Nutrition*, *10*(2), 230–258. https://doi.org/10.1080/19320248.2015.1004212

Zhang, K., Dearing, J., Dawson, T., Dong, X., Yang, X., & Zhang, W. (2015). Poverty alleviation strategies in eastern China lead to critical ecological dynamics. *Science of the Total Environment*, *506–507*, 164–181. https://doi.org/10.1016/j.scitotenv.2014.10.096

Zhou, Y., Zhu, Y., & Leung, S. (2016). PLS-frailty model for cancer survival analysis based on gene expression profiles. In H. Abdi, V. Vinzi, G. Russolillo, G. Saporta, & L. Trinchera (Eds.), *The Multiple Facets of Partial Least Squares and Related Methods* (pp. 189–199). Springer International Publishing. https://doi.org/10.1007/978-3-319-40643-5_14

Ziervogel, G., & Ericksen, P. (2010). Adapting to climate change to sustain food security. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(4), 525–540. https://doi.org/10.1002/wcc.56

Zimmerer, K. (2014). Conserving agrobiodiversity amid global change, migration, and nontraditional livelihood networks: The dynamic uses of cultural landscape knowledge. *Ecology & Society*, *19*(2), 260–274. https://doi.org/10.5751/ES-06316-190201